THE IRON TRADE REVIEW

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Broadening Market is Maintained

All Mill Products Now Show Enlarged Buying and New Inquiry—Pig Iron Begins to Awaken—Price Softness Appears in Various Spots—Government's Rail Buying Believed to be Forerunner of Heavy Purchases

ANOTHER week of revived buying and inquiry on a broadening scale points to the substantial character of the change in the tenor of the iron and steel market. In some products the tonnage closed with the mills during the past week has been the heaviest since the armistice. The disposition of buyers to place contracts for three to six months ahead continues to grow, further demonstrating the returning confidence in the stability of present prices and stands out as the paramount development in the situation. Sentiment on all sides is much more cheerful and hopeful.

In virtually every finished product the quickened demand has been plainly displayed. In wire products the past week's buying has been the best in several months and at present is estimated at the rate of 85 per cent of capacity. Some contracting has been done to Jan. 1. More steel bar consumers have covered their estimated needs to Oct. 1 and a large tonnage is under negotiation. The bar market now leads all others in point of breadth and tonnage. Sheet and plate demands are increasing though in a more gradual fashion. Heavier specifications against semifinished contracts reflect better finishing mill operations.

Rail Needs Pressing

Placing of the 200,000 tons of rails by the railroad administration at prices which the latter had disputed, is taken to indicate the imperative character of the demand. Other heavy orders it is believed are likely to follow. The division of the order gives 100,000 tons to the Steel corporation, 40,000 tons each to the Lackawanna and Bethlehem Steel companies and 20,000 tons to the Colorado Fuel & Iron Co. It develops that the railroad administration also recently placed 6000 tons of plates with the Steel corporation for canal barges at the full price of 2.65c Pittsburgh, which the industrial board had approved in its schedule.

As new business has expanded, reports of price shading have been more numerous although generally buyers seem to be more satisfied to pay the full schedule. The recent so-called export sale of 3000 tons of locomotive plates in the east by four mills at $3 per ton concession, has attracted considerable attention and it is reported other consumers have been able to develop a similar price from certain mills. The larger producers, however, are holding firmly to 2.65c Pittsburgh. Rather sharp concessions in sheets have been appearing in the Chicago market. Old steel bar orders on mill books in some cases since 1915 are being averaged with the present prices netting a figure below the prevailing level.

Iron Inquiry Heavier

Inquiry for pig iron from the gray iron and malleable foundries has undergone a considerable increase. A more liberal tonnage also has been converted into orders including a considerable amount for last half. The market has continued to develop some soft spots. Alabama iron is freely offered at concessions ranging from $1 to $2.25 at northern points to meet the advantages of location of the nearer furnaces. The common Alabama quotation at St. Louis now is $30 furnace for 2.25 to 2.75 silicon, equivalent to $24.50 Birmingham, for the base grade of 1.75 to 2.25 silicon. A much deeper cut is reported in some sections. Certain Buffalo makers have been reaching out for business in outlying territory and have pared their furnace price accordingly. The eastern basic market is more uncertain after a recent sale of 2000 tons at $25.50 delivered. Most producers insist this transaction cannot be duplicated, but others declare they will entertain propositions for round tonnages at this figure.

Export Sales Growing

Export rail inquiries are quite numerous, including 90,000 tons for India, 10,000 tons for Scotland, 10,000 to 20,000 additional for Japan, 5000 tons for Italy and 3600 tons for Belgium. A sale of 2400 tons of open-hearth rails to South America at $51 New York is reported. For the same destination 2000 tons of sheets were placed at 5.60c Pittsburgh. Export sales are growing with prices ruling slightly less than the domestic market.

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Institute Sounds The Keynote

PROSPECT and retrospect both were prominently delineated in the deliberations and atmosphere of the sixteenth general meeting of the American Iron and Steel institute at New York last week. A backward look over the past year embraces the most active as well as critical period of the war, in which the American iron and steel industry played one of the most essential and important parts. It was fitting, therefore, that the 1919 general meeting should review in some detail the war service and achievements of the American industry. The composite record thereby shown is so impressive that it will remain alike an enduring record to the patriotic zeal of the manufacturers and to the efficient management of the mills and furnaces of the country. It remained an appropriate climax for Marcel Knecht, representing French official circles, to offer the grateful thanks of France to the American iron and steel industry for her delivery from a brutal enemy and to invite the American Iron and Steel institute to visit next summer the restored iron fields of Lorraine.

The war ended, the more immediate thoughts and interest of the whole country have centered upon the business outlook. The response which it gained from the meeting of the institute was extremely gratifying and encouraging. With scarcely a discordant note, the crystallized sentiment to be drawn from this large gathering of producers and consumers—the largest in point of numbers, resources and employing power ever known—was one of distinct optimism. The future commercial prospects of this nation were pronounced to be of the brightest and in iron and steel, the basic industry of all, were described as unparalleled. As Judge Gary stated it, "Patience and confidence are justified, and with these, great prosperity is assured." Already according to the common note, buying sentiment has changed in a conspicuous degree in recent weeks and a perceptible though not a large expansion of business is resulting.

It has been manifest from signs on every hand that the country having gone through a psychological period of uncertainty and doubt, induced largely by the high price level, is nearing a point where it is more inclined to accept conditions at their face value and to release suspended enterprise. The meeting of the American Iron and Steel institute expressing the strong, convincing optimism of the most substantial business ability and interests of the country, has been fortunately timed and will have an important and beneficial effect upon changing public sentiment. The institute, as its great influence and the scope of the industry it represents, qualifies it to do, has sent forth a strong keynote of confidence to the whole country which will be widely heeded.

Permanent Quarters For Institute

AN idea which was freely expressed among individual members at the meeting at New York last week and indorsed wherever it was brought forth, concerns the establishment of permanent quarters for the American Iron and Steel institute. Though the suggestion is only in a very preliminary form and possses nothing definite as to how the objective might be worked out, the complete accord of opinion manifested in its favor is significant of its timely and appropriate character. No meeting has done more to set off the tremendous size and power which the institute has acquired as that of last week. In that same way it has demonstrated clearly the difficulties attendant upon the proper accommodation of an organization the meetings of which are so largely attended. If it has not done so already, the institute rapidly is outgrowing the facilities of private accommodation at New York or any other city prominent in an iron and steel way which might desire to entertain it.

The establishment of permanent quarters at New York whether in the form of a complete building adequately designed and constructed or of some other character is a look to the future. With its present 1500 to 2000 members and the prospects for greatly increasing this number and its consequent influence if it should choose, the time seems not far distant

when the institute seriously must entertain such a proposal. When it does and a permanent home of some kind is provided, it should be commensurate with the tremendous business power, rank and resources of the American iron and steel industry. It should represent a monument to the progress and applied genius of the greatest industry in all the world. That means if the leaders of the industry are of a mind so to do, it would be an institution exceeding anything of its character in any country of the globe.

Mr. Hines Talks Again

MR. HINES' final screed against the iron and steel manufacturers and particularly against the producers of rails was to be expected. Sooner or later it had to be forthcoming. For it was only a question of time before he would be obliged to approve orders for rails at the prices declared as reasonable by the industrial board based on its study of costs, but disputed by the railroad administration. Nevertheless, the distribution of an order for 200,000 tons had to be accompanied by some explanation to the public. Mr. Hines and those who have been his advisers have now supplied that explanation by throwing out a few fresh charges, but no fresh facts, a procedure which bears a strong similarity to what Washington describes as "saving your face."

Costs of production have and ever will govern the selling price of any manufactured article. Undoubtedly the chief item of steel costs today is labor and while there is a general antipathy in the iron and steel business, particularly toward reducing wages, it is thought probable that even should a reduction along this line eventuate, of necessity it would be negligible, at best. However, as was pointed out at a recent meeting of manufacturers held at Pittsburgh, if Mr. Hines wants 1,000,000 tons of rails and by holding out had been successful in obtaining a small reduction it would have represented only a nominal amount when compared to the loss in revenue occasioned by the railroads through the holding of general business in iron and steel as was the case. This especially is true at a time when the railroad administration is in debt to the extent of approximately $1,500,000,000.

Mr. Hines' expression of painful surprise that the rail producers should quote uniformly or above, the price pronounced to be a fair minimum by the industrial board, is so ridiculous that it is stamped simply as an affectation. Had the producers done anything else they would not have been true to their own business which means to their manufacturing costs. There is always an automatic and rigid brake on prices which the railroad administration seems not to have been willing to recognize, and that is the line of costs.

Mr. Hines' new blast need not be taken seriously. He has been talking all along the language of a purchasing agent, not that of a business man with a large outlook and appreciation of prevailing conditions. Unfortunately for himself personally, he has been inflicted, by his own choice or otherwise, with advisers who have proved themselves anything but an asset to his reputation as a reasonable and broad-gaged business executive.

Unionism and The Labor Shortage

THROUGH the port of New York a great stream of ex-American laborers are returning to their prior homes abroad. This exodus of aliens from the United States promises to grow when the passport restrictions are lifted and steamship transportation can be obtained. Our emigrants are chiefly nationals of countries recently relieved of German and Austrian domination, such as Hungarians, Roumanians, Poles, Lithuanians, although some Greeks and Italians are noted among them. Officials of the port are convinced that a very large proportion of these emigrants intend to repatriate themselves permanently.

This outward movement of humanity is not offset by the incoming persons. Immigration was practically stopped by the war and it is feared that the movement against us will exist for some years to come. Despite this tendency an effort is being made to revise the already drastic immigration laws and to exclude all foreigners for a fixed period. This is no time to discourage the importation of labor but rather to encourage it under proper safeguards. An agent of the war department has estimated that the United States is short 7,000,000 laborers today. This is the shortage when the amount of labor is compared with what it would have been had there not been a war.

While we have this actual labor shortage we are endeavoring to revamp our commerce and industry to the demands of peace. We are endeavoring to build up a great shipbuilding industry and an extensive merchant marine. We are anxious to extend our foreign trade, and of doing everything possible which will keep the United States in the enviable position industrially, commercially and financially where the war had placed us. Can we do all these things despite the threatened serious labor shortage? Can we do it by working fewer hours a day and fewer days of the week? The answer is obvious. If the American Federation of Labor is as sincere about the general welfare of the country as it is for the welfare of its members, why does not that organization lend its genuine aid toward the working out of a common sense solution of the problem?

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE, ORE AND OTHER PRICES ON PAGES 1456 AND 1458

Pig Iron

Bessemer, valley	$27.95
Bessemer, Pittsburgh	29.35
Basic, Pittsburgh	27.15
Basic, valley	26.75
Basic, delivered eastern Pa.	25.50 to 27.50
Basic, Buffalo, furnace	25.75
Malleable, Pittsburgh	28.65
Malleable, Chicago, furnace	27.25
Malleable, Buffalo, furnace	27.25
Malleable, delivered eastern Pa.	31.15

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern	2.25 to 2.75
No. 2X Eastern and Virginia	2.25 to 2.75
No. 1X eastern	2.75 and up
No. 1, Chicago	2.25 to 2.75
No. 2 foundry eastern	1.75 to 2.25
No. 1X, eastern delivered Phila.	$30.50 to 31.00
No. 2, foundry valley, Pittsburgh	28.15
No. 2 foundry, Cleveland furnace	26.75
No. 2 foundry, Ironton furnace	26.75
No. 1 foundry, Chicago furnace	28.00
No. 2 foundry, Chicago furnace	26.75
No. 2X, eastern del., Phila.	29.50 to 30.00
No. 2X, eastern, N. J. tidewater	29.10 to 31.50
No. 2X foundry, Buffalo furnace	28.00
No. 2 foundry, del. Philadelphia	28.50 to 29.00
No. 2 foundry, N. J. tidewater	28.35 to 30.25
No. 2 southern, Birmingham	25.75 to 28.00
No. 2 southern, Cincinnati	29.35 to 31.60
No. 2 southern, Chicago	30.75 to 33.00
No. 2 southern, Phila.	32.25 to 34.50
No. 2 southern, Cleveland	30.75 to 33.00
No. 2 southern, Boston	33.75 to 36.00
No. 2 soluthern, St. Louis	30.00
Virginia, No. 2X, furnace	27.50
Virginia, No. 2X, Philadelphia	31.60
Virginia, No. 2X, Jersey City	31.90
Virginia, No. 2X, Boston	32.20
Gray forge, valley, Pittsburgh	27.15
Gray forge, eastern Pa.	28.10
Silveries, 8%, furnace	40.25
Ohio Silveries, 8%, Chicago	44.05
Tennessee Silveries, 8%, Chicago	44.05
Low phos. standard, Phila.	42.00 to 44.00
Low phos. Lebanon, furnace	35.00
Low phos. standard, Pittsburgh	44.00 to 45.00
Charcoal, Superior, Chgo., last half	31.45

Coke

(At the ovens)

Connellsville furnace	$3.85 to 4.00
Connellsville foundry	4.50 to 5.25
Pocahontas furnace, nominal	5.00 to 5.50
Pocahontas foundry, nominal	6.00 to 6.50
New River foundry, nominal	7.50 to 8.00
New River furnace, nominal	7.50
Wise county furnace, nominal	5.00 to 5.50
Wise county foundry, nominal	6.00 to 6.50

Ferroalloys

Ferromanganese, 80 per cent delivered	$110.00 to 130.00
Spiegel, 16 per cent furnace, spot	27.50
Ferrosilicon, 50 per cent, spot and contract, delivered	80.00 to 90.00
Ferro carbon-titanium, carloads, producers plant, per net ton	200.00
Bessemer, ferrosilicon, 10 per cent	45.00 to 49.75
Bessemer, ferrosilicon, 11 per cent	48.00 to 53.05
Bessemer, ferrosilicon, 12 per cent	51.00 to 56.35

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

Semifinished Material

BILLETS AND BLOOMS

(4 x 4 inch)

Open-hearth, Pittsburgh	$38.50
Open-hearth, Philadelphia	42.50
Open-hearth, Youngstown	38.50
Bessemer, Pittsburgh	38.50
Bessemer, Youngstown	38.50
Forging, Pittsburgh	51.00
Forging, Philadelphia	55.00

SHEET BARS

Open-hearth, Pittsburgh	$42.00
Open-hearth, Youngstown	42.00
Bessemer, Pittsburgh	42.00
Bessemer, Youngstown	42.00

SLABS

Pittsburgh and Youngstown	$41.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$52.00
Grooved skelp, Pittsburgh	2.45c
Sheared skelp, Pittsburgh	2.65c

Shapes, Plates and Bars

(In cents per pound)

Structural shapes, Pittsburgh	2.45c
Structural shapes, Philadelphia	2.695c
Structural shapes, New York	2.72c
Structural shapes, Chicago	2.72c
Tank plates, Pittsburgh	2.65c
Tank plates, Chicago	2.92c
Tank plates, Philadelphia	2.895c
Tank plates, New York	2.92c
Bars, soft steel, Pittsburgh	2.35c
Bars, soft steel, Chicago	2.62c
Bars, soft steel, New York	2.62c
Bars soft steel, Philadelphia	2.595c
Bar iron, refined, Phila.	2.595c
Bar iron, common, Chicago	2.50c to 2.62c
Bar iron, common, Cleveland	2.52c
Bar iron, refined, New York	2.62c
Bar iron, refined, Pittsburgh	2.75c
Hard steel bars, Chicago	2.45c

Rails, Track Material

Standard bessemer rails, mill	$45.00
Standard open-hearth rails, mill	47.00
Relaying rails, light, St. Louis	35.00 to 38.00
Relaying rails, Pittsburgh	38.00 to 40.00
Angle bars, Pittsburgh base	2.75c
Angle bars, Chicago base	2.75c
Light rails, 25 to 45, mill	2.45c
Spikes, railroad, Pittsburgh	3.35c
Track bolts, Pittsburgh	4.35c
Track bolts, Chicago	4.62c
Track spikes, Chicago	3.62c
Tie plates, Chicago	2.75c

Wire Products

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	3.25c
Plain wire, Pittsburgh	3.00c
Galvanized wire, Pittsburgh	3.70c
Barb wire, painted, Pitts.	3.40c
Barb wire, galvanized, Pitts.	4.10c
Cut nails, Pittsburgh	4.445c
Coated nails per count keg, Pitts.	2.85c
Polished staples, Pittsburgh	3.40c
Galvanized staples, Pittsburgh	4.10c

Chain, Piling, Strip Steel

(In cents per pound)

Chain, 1 in. proof coil, Pitts.	6.50c
Sheet piling, base, Pittsburgh	2.55c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 5.05c.

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Sheets

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	4.35c
No. 28, bessemer, Pitts.	4.35c
No. 28, open-hearth, Chi.	4.62c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	4.35c
No. 28, bessemer, Pitts.	4.35c

GALVANIZED

No. 28, open-hearth, Pitts.	5.70c
No. 28, bessemer, Pitts.	5.70c
No. 28, open-hearth, Chi.	5.97c

BLUE ANNEALED

No. 10, open-hearth, Pitts	3.55c
No. 10, bessemer, Pitts.	3.55c
No. 10, open-hearth, Chi.	3.82c
No. 10, open-hearth, Phila.	3.795c

Tin Plate

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.00

Iron and Steel Pipe

Base Pittsburgh to Jobbers Carloads

Base, Pittsburgh	Black	Galv.
	Per cent off	
⅜ to 3 in., butt, steel	57½	44
¾ to 3 in., butt, iron	39½	23½

Boiler Tubes

Steel, 3½ to 4½ inches, l. c. l.	40½
Iron, 3½ to 4½ inches, c. l.	16

Cast Iron Water Pipe

Without War Freight Tax

(Class B Pipe)

Class A pipe is $1 higher than Class B.

Four-inch, Chicago	$54.80
Six-inch and over, Chicago	51.80
Four-inch, New York	55.70
Six-inch and over, N. Y.	52.70
Four-inch, Birmingham	51.00
Six-inch and over, Birmingham	48.00

Hoops, Bands, Shafting

Hoops, Pittsburgh	3.05c
Bands, Pittsburgh	3.05c
Hot rolled strip steel, Pitts. stamping quality	3.05c to 3.30c
Shafting, Pitts., carloads	28 off list

Rivets

Structural rivets, Pittsburgh	3.70c
Boiler rivets, Pittsburgh	3.80c
Rivets ⅞ in. and smaller Pitts.	65-10-5 off

Nuts and Bolts

(Prices f. o. b. Pittsburgh)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	60–5 off
Cut thread	50–10–5 off
Larger and longer	45–10 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	60–10–5 off
Cut thread	60–5 off
Larger and longer	50–10 off
Cold pressed semifinished hexagon nuts ½ in. and larger	70–10 off
Cold pressed semifinished hexagon nuts ⅞ in. and smaller	80 off
Gimlet and cone point lag screws	65–5 off

NUTS

Hot pressed, square blank	3.25c off
Hot pressed, square tapped	3.00c off
Hot pressed, hexagon blank	3.25c off
Hot pressed, hexagon tapped	3.00c off
Cold pressed, square tapped	3.00c off
Cold pressed, square blank	3.25c off
Cold pressed, hexagon blank	3.25c off
Cold pressed, hexagon tapped	3.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago)

Quotations on leading products May 28, average for April, 1919, average for February, 1919, and average for May, 1918. Prices are those ruling in the largest percentage of sales at the dates named.

	Price May 28, 1919	Average prices April, 1919	Feb., 1919	May, 1918
Bessemer, valley del., Pittsburgh	$29.35	$29.35	$33.60	$36.15
Basic, valley, del., Pittsburgh	27.15	27.15	31.40	32.95
*No. 2 Foundry, Pittsburgh	28.15	28.15	32.40	33.95
*No. 2 Foundry, Chicago, furnace	26.75	26.75	31.00	33.00
Lake Superior charcoal, Chicago	31.45	33.25	38.70	37.50
Malleable, valley	27.25	28.65	32.90	34.45
Malleable, Chicago	27.25	27.25	31.50	33.50
**Southern, No. 2, Birmingham	25.50	28.00	32.25	33.50
*Southern Ohio, No. 2, Ironton	26.75	26.75	31.00	33.00
Basic, eastern del., eastern Pa.	25.50	29.65	33.90	32.00
**No. 2X Virginia, furnace	27.50	28.44	33.00	33.50
**No. 2X, eastern del., Philadelphia	29.60	31.90	36.15	34.25
Ferromanganese, 80 per cent, delivered	120.00†	130.00†	187.25	250.00
Bessemer billets, Pittsburgh	38.50	38.50	43.50	47.50
Bessemer sheet bars, Pittsburgh	42.00	42.00	47.00	51.00
Open-hearth sheet bars, Pittsburgh	42.00	42.00	47.00	51.00
Open-hearth billets, Pittsburgh	38.50	38.50	43.50	47.50
Steel bars, Pittsburgh	2.35	2.35	2.70	2.90
Steel bars, Chicago	2.62	2.62	2.97	2.90
Iron bars, Philadelphia	2.595	2.595	3.295	3.50

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon. †70 per cent.

	Price May 28, 1919	Average prices April, 1919	Feb., 1919	May, 1918
Iron bars, Cleveland	$2.52	$2.657	3.25	3.64
Iron bars, Chicago mill	2.55	2.58	2.95	3.50
Beams, Chicago	2.72	2.72	3.07	3.00
Beams, Pittsburgh	2.45	2.45	2.80	3.00
Beams, Philadelphia	2.695	2.695	3.045	3.18
Tank plates, Pittsburgh	2.65	2.65	3.00	3.25
Tank plates, Chicago	2.92	2.92	3.27	3.25
Tank plates, Philadelphia	2.895	2.895	3.245	3.43
Sheets, blk., No. 28, Pittsburgh	4.35	4.35	4.70	5.00
Sheets, blue anld., No. 10, Pittsburgh	3.55	3.55	3.90	4.25
Sheets, galv., No. 28, Pittsburgh	5.70	5.70	6.05	6.25
Wire nails, Pittsburgh	3.25	3.25	3.50	3.50
Connellsville furnace coke	3.85	3.81	4.125	6.00
Connellsville foundry coke	4.75	4.56	5.125	
Heavy melting steel, Pittsburgh	16.00	15.75	17.00	29.00
Heavy melting steel, eastern Pa.	15.00	15.88	15.25	28.50
Heavy melting steel, Chicago	15.50	16.38	14.88	30.00
No. 1 wrought, eastern Pa.	22.50	21.50	25.00	34.00
No. 1 wrought, Chicago	17.25	18.50	16.63	35.00
Rerolling rails, Chicago	17.75	17.94	15.56	35.00

(FOR ADDITIONAL PRICES SEE PAGES 1456 AND 1458)

Pig Iron Inquiry Expands Briskly

Buyers in Various Districts Come Out More Freely for Foundry and Malleable Grades—Some Last Half Tonnage Being Closed—Price Concessions Continue in South, at Buffalo and in Eastern Territory

Cleveland, May 27.—A sharp increase in inquiry with some enlargement of buying has featured the pig iron market in this territory during the past week. New inquiries from Cleveland and surrounding districts total at least 10,000 to 15,000 tons. Most of this is in foundry iron representing lots of 500 to 1000 tons but there is one inquiry for 1400 tons for last half shipment. A Johnston, Pa., radiator manufacturer is one of those inquiring for 500 tons. Prices also have been asked on 1500 tons of standard forge iron for June-August delivery. Sales have included a considerable tonnage for last half, largely foundry iron and it is becoming increasingly evident that melters are a little more anxious to cover for that period. Reports from local foundries show that some betterment in castings orders is entering into their change of mind toward forward buying. Some sales of malleable in Cleveland and other districts also have been made. These include 3000 tons to one consumer and two lots of 600 tons each all for last half upon which full prices are reported to have been obtained. A sale of 3500 tons of forge iron in Pittsburgh territory also has been closed. While local furnaces have been holding prices firmly they have been encountering competition from outside sources at concessions. Alabama iron is reported to have been offered in this territory at material cuts. Some concessions have been made by certain Buffalo interests but these have been more in northwestern Pennsylvania than in this section. Steelmaking iron shows no interest on the part of buyers. Shipments are holding up at about the same gait as recently and various furnaces still are piling a fraction of their output.

Total Orders Are Heavier

Boston, May 26.—On the heels of Judge Gary's cheerful remarks in New York, New England pig iron dealers see better business actually arrived. A sale of 500 tons of Virginia iron is reported for July delivery by one firm which also has received orders for smaller amounts to be delivered in August and September. A textile machine manufacturer is in the market for 250 tons of foundry iron and inquiries are increasing among most industrial consumers. Machine toolmakers are especially active, one large Providence plant having changed during the past week from a three-day to a five-day basis and many others are working full time, with increased demands for iron. The bulk of the pig iron sales still is made up of small lots but the aggregate is favorable. One concern reports a larger total of actual orders during the past week than it is has enjoyed for several months. It is understood this total is about 4000 tons.

Forward Buying Improves

New York, May 26.—Growing belief on the part of pig iron consumers that present prices are about as low as is possible on the present basis of costs is resulting in a considerable improvement in the volume of business placed for forward delivery. Sentiment among pig iron producers has improved, and although the market cannot be quoted higher there is a firmer feeling as to prices. Business during the past week reached a larger total than in previous weeks, and new inquiries also have increased. Comprised in the sales made during the past week were several round lots. One consumer bought 2000 tons of foundry, charcoal and forge iron for third quarter, and there were several sales of foundry for third quarter and last half, ranging from 500 to 1000 tons each. Charcoal iron is being sold at the regular western price schedule, which is $36.50, furnace, for prompt shipment, and $29.25, for last half. The freight rate on this iron to New York is $6.50. Included in recent business for third quarter were 500 tons of malleable, sold at resale. Some malleable now is being sold at $27.25, Buffalo, while resale iron in some cases is going at around 50 cents per ton less. Furnaces in some

cases will not sell gray forge iron at a figure so much less than the old price schedule as on the higher silicon irons. Some eastern Pennsylvania gray forge has been sold during the past week at prices equivalent to $27 to $28, furnace. Current inquiries for forward shipment run into thousands of tons. One melter wants 1000 tons of malleable for third quarter, another wants 1000 tons of foundry for last half, and there are numerous inquiries for foundry for third quarter and last half involving 500 to 1000 tons each. Included in business during the past week was one lot of 1000 tons of foundry which was sold at regular domestic prices for export to Italy. Incidentally, southern makers which are reported to be absorbing the freight disadvantage in connection with sales they are making in the Chicago and Cincinnati districts, are not showing any disposition to compete with northern furnaces in this district.

Fair Demand for Foundry Iron

Pittsburgh, May 27.—Small lot transactions still are the rule in the pig iron market here although a few fair-sized tonnages have been placed during the past week. One sale of 3500 tons of barge to a Pittsburgh district user has been closed. A lot of 1000 tons of No. 2 foundry for delivery over the third quarter has been booked by a valley producer and several sales of 500-ton lots also have been made with a generous number of smaller tonnages. As a rule this business has been done at the regular price of $26.75 furnace for the base grade, but one lot of 500 tons was moved at $26 f.o.b. an eastern Pennsylvania furnace. It is understood that the price was cut in this latter case to equalize freights as the iron was bought by a northeastern Ohio consumer who has a much lower freight rate either from the valley or from Cleveland than from the furnace that took the business. The Standard Sanitary Mfg. Co. again has entered the market for 2000 tons of foundry iron for its Louisville, Ky., plant for June shipment. This inquiry has been before makers for about a week but has not yet been closed. The company has expressed a preference for southern iron, but would place some of the business in southern Ohio provided the iron from this section was not too low in phosphorus. The inquiry calls for equal tonnages of 1.75 to 2.25 and 2.25 to 2.75 silicon iron, and the company expects to duplicate the June purchase for July. Quite a few inquiries lately have come out for low phosphorus iron and some business has been done in copper-bearing iron at $43.75 furnace. It is understood that some copper free low phosphorus iron has been sold for slightly under the regular base of $46.75 furnace. A few small lots of standard bessemer have been moved at full quotations and since improvement is reported in the ingot mold business, expectations run strong for an early expansion in the demand for this grade. Little is going on in basic iron although an inquiry for 5000 to 6000 tons has reached this market from a Cleveland district steel manufacturer. A recent sale of 1000 tons to a consumer in this district went 50 cents under the market. No offerings of iron are being made by the steel manufacturers, some of whom are said to be using up accumulated stocks in place of scrap. The Carnegie Steel Co. now has 30 of its stacks in blast; a week or 10 days ago the number active was 26. It is reported that a valley merchant producer now operating one of his three stacks shortly will blow out the furnace in operation, which has a monthly capacity of about 11,000 tons, and will blow in one having a capacity of about 15,000 tons monthly.

Business Improves at Buffalo

Buffalo, May 27.—The pig iron situation has improved. All interests report good inquiry, and larger volume of business. Makers are beginning to talk of higher prices. One interest announces that no more iron will be sold at present prices for last half delivery. This interest reports inquiries for 20,000 tons of foundry. Another interest here reports inquiries for 10,000 tons during the past week. Another interest reports some orders ranging from 200 to 250 tons. Furnacemen point out that the ore price is fixed and coke will not go any lower, so prices must be revised upward if profits are to be taken. None of the furnaces which were out for lack of business or relining has been relighted, although one interest which has both its stacks down intends to put its No. 1 into blast within three or four weeks.

Buy for Last Half

Chicago, May 27.—Buying for last half finally has started in a small way in the Chicago district and practically all pig iron producers now have on their books a few contracts from regular customers covering requirements for third quarter or the remainder of the present year. More inquiry is being entertained now than has been the case since the first of the year, lots up to 1000 tons being asked. No large tonnages above this figure have been presented. While present commitments for delivery after July 1 do not aggregate much tonnage, the fact that some buyers have broken over indicates a change in sentiment and gives promise that general buying will be done before long. Another factor giving promise of heavier buying is an increased demand for foundry coke which can mean only that more iron is being melted than has been the case. Inasmuch as production in the north always has been less than normal demand on the part of melters, and much southern iron always has moved into this district, it is believed present circumstances surrounding southern iron will prevent its shipment here as freely as usual and buyers will recognize this fact and seek to cover their needs with northern makers. Iron piled on furnace yards is less than tonnage due on deferred orders and with production curtailed to the degree that now exists, and with shipments being made freely, this will not burden the market. One southern producer who has been selling prompt iron at delivered prices equal to northern iron, absorbing the difference in freight, has begun to accept contracts for moderate tonnages covering third quarter. This indicates the possibility of southern iron competing with northern to a greater degree than had been expected. High silicon iron from Jackson county and Tennessee is selling somewhat better with quotations practically at the last price fixed by the government. Total inquiry for silveries aggregates about 1000 tons. There is little inquiry for charcoal iron but the base grade is quoted at $29.25, furnace, for prompt shipment in small lots, the same quotation which applies to last half deliveries.

Firmer Tone at Cincinnati

Cincinnati, May 26.—The market has assured a firmer tone and while some iron is sold below the schedule, offsetting this are sales of small lots at the full price of $26.75 furnace. Some southern furnaces having freight rate differentials are willing to waive these and in some cases there has been a willingness to equalize freight rates in competition with southern Ohio. A larger inquiry is reported from outside melters. The local melt is not averaging up to what it should be, due to a molders' strike affecting a number of foundries in this vicinity, and also to the slowing down in the demand for castings from machine tool firms. Leading pig iron houses are of the opinion that prices will be readjusted on a higher level before the end of the second half period. Neither malleable nor basic are showing any signs of life but high silicon iron still is in good demand.

Absorb Freight Charges

St. Louis, May 24.—Fairly good sales of pig iron in car lots are reported, while inquiries are out for larger tonnages. One east side melter has put out an inquiry for 1000 tons of No. 2 foundry iron, and another is asking for prices on 300 tons of the same grade. No. 2 southern foundry iron is quoted generally at $30 a ton, the reduction of $2.25 representing freight absorption to meet northern competition. Practically all southern furnaces are quoting on this basis, although there is one notable exception. A leading Birmingham producer which is a large consumer of its own product, is not quoting, and this is interpreted to mean that it is holding its iron in anticipation of heavy needs of its steel plants in the near future. Many consumers who earlier in the year requested delayed deliveries are now asking that shipments be expedited.

Some Inquiries for Tonnages

Birmingham, Ala., May 27.—Practically all of the pig iron sales are in one to three car lots, but occasionally an inquiry is received for a considerable tonnage for delivery during the last half. Consumers are still looking for concessions, but producers have announced that iron for last half delivery will be sold at prices named in the recent conference at Washington. As previously reported, however, certain Alabama furnaces when competing for northern business are absorbing the freight against them amounting in some cases to $2 to $3. The Woodward Iron Co. has but one furnace in operation. The Shelby Iron Co.'s charcoal furnace is down. Two other furnaces are scheduled to go out of

blast during the week. No. 2 foundry iron for last half delivery is held at $26.75 per ton.

Prices Show Irregularity

Philadlephia, May 27.—Improved buying which characterized the pig iron market in eastern Pennsylvania recently, was not maintained the past week although a fair amount of selling is reported. This involves chiefly foundry iron for prompt, June and July delivery. Demand for future delivery is less noticeable than in some other districts. At the same time there is not much anxiety on the part of the furnaces to sell ahead. One consumer is inquiring for a small tonnage of foundry iron for last quarter from his usual source of supply. The leading Virginia interest has announced it will book orders for shipment only wthn 30 days. Prices on foundry iron continue to vary widely, and quotations are lower. As a rule when the furnaces have a tonnage on hand and desire to move it, No. 2 X foundry, or 2.25 to 2.75 foundry silicon can be quoted from $29.50 to $30 delivered, Philadelphia, and No. 1 X or 2.25 silicon and upward, at $30.50 to $31, and No. 2 plain or 1.75 to 2.25 silicon, at $28.50 to $29. At the same time higher prices are being done. Several hundred tons of gray forge were sold at a price equivalent to $29.45 delivered, Philadelphia, several sales of 2.25 to 2.75 silicon iron were made at $30 furnace and of 2.75 and upward silicon at $31 furnace. Conflicting reports regarding the basic market are current. Some producers claim that a recent sale of 2000 tons for early shipment at $25.50 delivered could not be duplicated, but one producer is willing to entertain a proposition of 5000 tons at the same figure, and declares that the market is not above that shown. Recently 1500 tons of standard low phosphorus was sold at $42 furnace. This grade now is quoted at $40 furnace at which level it can be had without difficulty. Lebanon copper-bearing iron still may be had at $35 furnace, from some producers, though in the west this grade has commanded higher prices.

Coke Inactive; Prices Firm

Producers Indifferent as to Inquiries for Second Half—Arguing For Higher Prices—Foundry Coke Moving Along Steadily

Pittsburgh, May 27.—Outside of a sale of 150 cars of standard furnace coke for delivery over the remainder of this month at $3.90, ovens, the market here has been devoid of activity. This sale was made to a steel company in the Pittsburgh district ordinarily self-contained in coke supplies, but which has labor troubles at its own coal properties. Other demands have been few and small, but sufficient to absorb all free offerings and keep prices quite firm. Connellsville production two weeks ago fell to the lowest level in many years, with merchant producers having more ovens in operation than those with blast furnace connections. Merchant production was barely sufficient for contract requirements, and some ovens were lighted last week. Standard furnace coke still takes a range generally of from $3.85 to $4, ovens, and while occasionally $3.75 is done, too little coke is available or selling at that figure to give it real basis. Quotations of from $4 to $4.25 given on contract coke refer to monthly contracts, for nothing has been done thus far in last half business. Efforts of consumers to line up contracts for the six months ending Dec. 31, have found producers indifferent. Opinion still veers in the direction of a sliding-scale price arrangement for last-half contracts, although some coke producers still oppose that kind of an agreement. What basis last-half shipments will take is a question, but just now it looks like a minimum of $4.50. Producers are glad to sell spot coke at $4, but sales at that price involve no such risk to operators as would a long-time agreement, even above that level. The labor situation is threatening, with many foreign workmen making plans to leave the country. In the event the pig iron situation improves further, coke producers argue they are entitled to some of the benefits. Foundry coke is moving off steadily and here, as with furnace fuel, free offerings being moderate, prices are firmer. The full range is from $4.50 to $5.25, ovens, but $5.25 is not done frequently, while $4.75 is a more general minimum than is $4.50. Connellsville coke production for the week ended May 17, is estimated by *The Connellsville Courier* to have been 83,284 tons, as compared with 100,980 tons in the previous week.

May Fix Own Price

Boston, May 27.—Inquiries for foundry coke indicate that the market is much firmer. One seller received during the week inquiries aggregating about 20,000 tons. Some orders for last half delivery indicate that the condition of overstock of coke which prevailed at many foundries at the first of the year is commencing to change. A better prospect of business ahead is making consumers more venturesome in future ordering.

By-product coke interests are said to be considering breaking away from the Connellsville basis of price fixing for the New England territory. The amount of the beehive coke reaching this district is almost negligible as a market factor. Now with a new maker, the Providence Gas Co., definitely lined up in the foundry coke field it is thought logical that an independent local price should be determined.

More Demand is Shown

Cincinnati, May 28.—Foundry coke consumers are calling for coke due them on contract, shipments of which have been held up. It is understood that consumers' supplies are being exhausted faster than was anticipated. There is also more buying for foundry coke in small lots for prompt shipment and it is rumored that a few contracts for furnace fuel have been signed recently covering a supply for the remainder of the year. Since, so many iron furnaces are now closed down that it will not be difficult for coke producers to fill any demands made on them.

Market Continues to Improve

St. Louis, May 27.—The coke situation continues to improve, although the volume of actual business is not impressive. Numerous inquiries are out for both furnace and foundry grades, and prices are steady to a shade firmer. A fair demand has sprung up among melting interests in the West and Northwest. Another encouraging feature is the better demand for coal, especially steam grades.

No Improvement in Sight

Birmingham, Ala., May 27.—No effort is being made to increase the coal and coke output in Alabama, as demand continues to lag. The advertisements of the coal operators advising the public to stock up on fall and winter coal is doing but little good. Producers do not look for any change until the pig iron market improves.

Ore Sales Continue Fair

Tonnages Sold Slightly Less Than Preceeding Week—Ford Coming Into Market—Months Shipment About 6,000,000 Tons

Cleveland, May 27.—Sales of iron ore continue in fair volume, although the aggregate for the past week is not equal to that of the preceding period, when, stimulated by the sudden change in conditions relating to the iron and steel market, sales totaled 500,000 tons. Large tonnages are going forward to connected interests, but aside from that the market is not entirely satisfactory, although furnaces give indication of closing contracts in the near future. Confidence and optimism as to a strong upward trend are based on the large number of inquiries received and the knowledge that furnaces which have been lfolding off must soon do more than estimate requirements.

Some interest in the market was caused by the report that Henry Ford will be operating his furnaces by early fall and that he has been negotiating for a considerable tonnage of ore. In some quarters it is intimated that orders have already come from this source.

Shipments of ore during the current month will approximate 6,000,000 tons. The total shipment up to and including May 22 amounted to 4,396,373. The total for the month will be far in excess of the preceding month when the total was 1,412,239, but less than in May, 1918, when it was 8,792,231. Half of the tonnage shipped this month has gone to the United States Steel Corp., and the bulk of the remainder to furnaces owning or operating their own mines.

Scrap Market Firming Up

Some Grades at St. Louis Sell Higher—More Buoyant at Chicago —Pittsburgh Buying Still Drags

FOR COMPLETE SCRAP PRICES ON PAGE 1458

St. Louis, May 24.—For the first time in weeks consumers of scrap iron and steel are taking a slight interest in the market. Certain grades have been marked up from 50 cents to $1.50 per ton. Cast iron especially is strong, this grade being scarce and in good demand for small lots. A moderate demand has sprung up for steel scrap, which advanced 50 cents to $1. A few of the local steel mills have been buying small lots and this is regarded as a hopeful sign. Nothing is coming in from the surrounding country, the railroads being the only source of supply. The only offerings before the market during the week were 400 tons of car wheels from the Wabash and 700 tons of scrap from the Missouri, Kansas & Texas.

New England Expects Rise

Boston, May 24.—Scrap is at its low ebb here and is believed by many to be lower than it will be again for many years. Some dealers in iron and steel scrap are so confident of an early rise in the market that they are not seeking sales at the present prices. Inquiries from Pennsylvania and Ohio steel furnaces, the principal consumers of New England iron and steel scrap, are still very light but one dealer reports orders for iron foundry scrap from consuming points in the local territory which have not heretofore come into the market. Small lots of steel scrap are always moving but there is nothing which can be pointed to as affecting the market. One car of heavy melting steel sold at $11.50 during the week and other carload transactions have not varied much from this.

Quotations Unchanged

New York, May 26.—Quotations on iron and steel scrap remain nominally unchanged. Most dealers have no large supplies on hand, and are in a position to await developments. Continued inactivity is proving discouraging, and there are some who believe that a turn for the better is still several weeks off. With consumers showing virtually no interest those dealers who are becoming anxious to move their stocks find the market highly unfavorable.

Dealings Still Drag

Pittsburgh, May 27.—No appreciable increase has taken place in the demand for scrap iron and steel and prices generally are nominal. Steel manufacturers maintain an attitude of indifference with regard to supplies beyond those for which they have contracted and the market is largely a dealers' affair. Those of the latter who have courage enough to go ahead and lay in stocks want to do so as cheaply as possible and current prices for the most part reflect the views of dealers. No trouble is had in moving all of the heavy melting steel which becomes available at $16 delivered, but comparatively little of this grade is coming out at that price and it is said that the appearance of a round-lot order would bring a quick increase of as much as $2 per ton. While low phosphorus pig iron is reported to be moving quite steadily, demand for that grade of scrap remains extremely limited and quotations merely are approximations based on dealers' efforts to secure offers. Practically no demand is coming out for cold sheets in the Pittsburgh district and doubt is expressed that sales could be made at better than $14, although it is understood a higher price has been paid by West Virginia mills. The market continues dull and easy on machine shop turnings and cast iron borings.

Developments Are Expected

Buffalo, May 27.—Scrap men say that the market is on the eve of developments. Interest here has been keen for three weeks, but there has been no particular activity except in certain grades including cast scrap and turnings. The latter have been in demand outside the territory and there is a call for cast scrap within the district. There is a strong undercurrent of interest evident, however, and a buying movement is looked for at any time.

Hold Scrap for Higher Prices

Cleveland, May 27.—Melters and dealers who have been trying to locate scrap iron and steel, particularly heavy melting steel, are finding that yard interests have nearly a monopoly. Offers of $15.50 for steel to dealers have not been productive for the reason dealers are unable to cover. Scrap is scarce because of the low production the past few months, and a sizable percentage of what has been available has been thrown down by yards awaiting a rise. Yard interests say they will hold on to their accumulations for an advance. Many maintain that on steel, for instance, they must get at least $18 to break even. This represents $2.50 a ton over this week's quotation. Scrap is going to soar, dealers predict. They say $20 steel in a few months would not surprise them. Melting steel and No. 1 busheling have advanced 25 cents a ton while cast borings and axle turnings are down. No. 2 busheling, grate bars, heavy cast and stove plate have been pushed up slightly.

Scrap Sentimentally Higher

Chicago, May 27.—With fundamental conditions in the iron and steel market apparently presaging great activity later in the year, the iron and steel scrap market is feeling buoyant. While this is not caused by increased buying on the part of consumers, the fact is that dealers generally are decidedly bullish and are holding their material at advances of 50 cents to $1 per ton above the levels prevailing most of last week. This indicates the feeling on the part of dealers that consumers must buy to some extent before long and that prices will rebound sharply when buying is started. Considerable accumulations of scrap seem to exist, in the yards of consumers and in dealers' yards, with railroads offering considerable accumulations also. Dealers not only are holding their scrap at higher quotations but are paying considerable more for supplies from railroads. The Chicago, Burlington & Quincy offers 2135 tons, the Illinois Central 5900 tons, including 500 tons each of No. 1 and No. 2 wrought, and 450 tons of knuckles and couplers; the Chicago

Government Selling Scrap

Philadelphia, May 27.—Bids were taken Saturday by the Philadelphia ordnance office on a round tonnage of shell forgings. Perry, Buxton & Doane were low at $17.10. Bids also were taken on shell plugs and billets. The Allentown ordnance office likewise has some scrap to sell. The impression is prevalent in the market that scrap prices are low but that consumers have a fair supply and as deliveries on old contracts are being made constantly to them, they are not likely to buy more tonnage until their operations warrant it. Machine shop turnings are quoted at $10.50 to $11. Prices in some grades show considerable variation. While guaranteed low phosphorus plate scrap is bringing $21.50 to $22 delivered, one dealer has accumulated considerable stock at $18.50 to $19, delivered. The American Board of Scrap Iron Dealers which postponed the May 15 meeting has not yet decided on a new date, but expects this will be held about the middle of June and the question of making the organization a permanent one will be discussed.

Market Looks Better

Cincinnati, May 26.—A much better feeling exists with the trade, as consumers seem to have realized that the bottom has been reached and are more inclined to purchase ahead. From a seller's standpoint this evidently is not a very attractive proposition as contract prices now named are now above figures that would be accepted for metal for nearby shipment. Rolling mills are taking more interest in the future market, but are placing no orders except for scrap to be shipped within the next 30 days.

Melters Plan to Resume

Birmingham, Ala., May 27.—Dealers in scrap iron and steel in the South are waiting for an expected improvement in the market. There is a good stock of scrap in dealers' hands in this district, but consumers also are waiting, except as to cast and heavy melting steel.

Six Mills

Will Divide 200,000-Ton Rail Orders—Purchase Helps Market

Chicago, May 27.—Announcement that the United States railroad administration would proceed to buy 200,000 tons of standard steel rails on the bids recently opened at the prevailing price has done much to assist the steel market in general and demand for steel for railroad use in particu-

lar. The rails will be furnished by six companies but the division of the tonnage has not yet been announced. It is understood delivery by July 1 will be asked and under present circumstances no difficulty will be met in fulfilling this request. Purchase of these rails must stimulate demand for track fastenings, as many important roads are not in possession of sufficient material to lay the rails while some others have sufficient stocks to carry them for a while. Release has been given the leading interest on steel for 350 military cars which had been held up since the end of the war, but which the builder has now been authorized to complete. The Mt. Vernon Car Co. has been given a contract for 100 live poultry cars. Demand for light rails is increasing somewhat, having been fairly quiet on account of mine work being interrupted. Light rails for export, especially to Japan, are being asked in fairly large tonnage in this market and South America is taking considerable material from mills further east. Practically any delivery can be made at present, as the western mill usually has some stock on hand and can give prompt service.

Will Place Locomotives

Philadelphia, May 27.—The railroad administration is expected within the next few weeks to place various orders including one especially for 30 locomotives.

Rail Order Not Yet Received

Pittsburgh, May 27.—Although the railroad administration several days ago announced the award of 200,000 tons of open-hearth rails, the order for the quota awarded to the Carnegie Steel Co. has yet to make its appearance and the rail mills of that company still are running at a low rate. Only a moderate amount of domestic business remains on its books and while it has some foreign business it is not particularly large. Demand for light sections remains moderate and not much is going on in spikes either large or small. Some inquiries are coming out from the railroads for standard spikes but they rarely materialize into orders.

Small Rail Orders Placed

Cleveland, May 27.—Some small lot buying of rails has been done in this territory. A leading industrial company placed about 850 tons of standard rails together with the track fastenings. The Cleveland Railway Co. placed 500 tons of T-rails. Some other small lots are in prospect.

New Mills Ordered

Contracts for four new sheet mills have been let to the Hyde Park Foundry & Machine Co., Hyde Park, Pa., by the Trumbull Steel Co., Warren, O. These mills will be installed at the plant of the Liberty Steel Co., Warren, O., a subsidiary of the Trumbull company. Upon completion of these units the Trumbull Steel Co. will engage in the manufacture of high-finished sheets, its Warren plant being confined solely to the making of black, blue-annealed, galvanized and tin-mill black.

English Ferro is Reduced

Spiegel Market Defined at $27.50 by 1000 Ton Sale—50 Per Cent Ferrosilicon Sells at $80 to $85

New York, May 26.—One English maker has named to its selling agent here a new price on 80 per cent ferromanganese, which is somewhat lower than that last quoted. This maker is willing to sell at £30 c.i.f. Atlantic tidewater, equivalent to about $145. Included in current inquiries is one from a large western consumer for several hundred tons of 80 per cent metal for second-half shipment, but there are no assurances that this business will be closed. Other inquiries are restricted to carloads. A recent inquiry for 1000 tons of ferromanganese for export has not resulted in a sale.

What is probably the first important sale of spiegeleisen since the armistice has been closed, involving about 2000 tons. This business was placed on the basis of $27.50 a ton, f.o.b. furnace, for 16 per cent alloy. This sale reestablishes the market, which for some time had been considered nominal.

The market for ferrotungsten remains quiet, with some business being taken by domestic makers at $1.35, furnace, per pound contained, standard alloy. Considerable talk has been heard about low-priced offerings of ferrotungsten by English makers, but so far as known, not a pound of English metal has been sold in this market.

The market for ferrovanadium reflects less interest than for some time. Dealers supplied a large part of the excitement in recent months but now are finding consumers less anxious to lay in the alloy at current quoted prices. Supplies, however, continue scarce.

Some 50 per cent ferrosilicon has been sold for early shipment, in carloads, at prices ranging from $80 to $85, delivered, and consumers also are figuring on their forward requirements, but there has been little contract business reported as yet.

Prices Still Are Easing

Pittsburgh, May 27.—Improvement in the steel situation has not bettered demand for ferroalloys, although inquiries for 50 per cent ferrosilicon are more numerous. Prices still lean in favor of buyers, more especially on resale tonnages, offerings of which still are coming out freely enough to meet all current requirements. A small tonnage of resale 80 per cent ferromanganese is reported to a valley consumer at $90 delivered. This is somewhat below the general asking price average, the market being from $100 to $115, while at least one producer is holding for $150 delivered, on direct business. In general, however, makers are not asking more than $130 and it is reported one maker is practically meeting the resale quotations. Some resale business in 16 to 21 per cent spiegeleisen is noted at $27 furnace, with makers quoting $30 to $35 on new business but booking practically no orders at either price.

As low as $80, freight allowed, is heard on new business in 50 per cent ferrosilicon, and while some makers are not quoting less than $90 no important business has lately been negotiated at higher than $85. Some resale business is known to have been done as low as $75. Rather more inquiry has lately developed for bessemer ferrosilicon, with small sales of 10 per cent noted at $45 furnace. A higher quotation than this finds no basis in sales.

Meet Reduction

Eastern Cast Pipe Makers Equalize Prices With Cut in West

New York, May 26.—Eastern cast iron pipe makers are reducing offerings to meet the $5 reduction put in effect last week by several western makers. While not all have taken this action, the market in the East appears to be firmly established at the new levels and may be quoted as follows on class B pipe: 4-inch, $55.70, New York; 6-inch and over, $52.70. Class A pipe is quoted $1 higher. This latest reduction is stimulating buying. More business is being placed than in several weeks. Municipalities continue to hold off. The only recent public work involved about 100 tons of 6-inch pipe for New Britain, Conn. This business went to R. D. Wood & Co. at $51.40 a ton.

Pipemakers Well Booked

Pittsburgh, May 27.—Manufacturers of steel and wrought iron are well supplied with business in their lapweld departments and also note a better general demand for buttweld sizes. New building operations are expanding, and jobbers are in the market for replacement tonnages. Considerably less talk of price cutting is heard.

Pipe Buying Better

Chicago, May 27.—Considerably more activity is noted in demand for cast-iron pipe, promoted undoubtedly by the fact that the season for laying pipe is growing fairly late and few purchases have been made. Bids will be opened at Cleveland May 29 on 900 tons and at Baker, Mont., June 3 on 470 tons. Bids were opened May 26 at Chicago on 980 tons and at Springfield, O., on 125 tons, awards not yet being made. The United States Cast Iron Pipe & Foundry Co. has been given a contract for 900 tons by Brainerd, Minn., and the National Cast Iron Pipe Co. has taken 500 tons for Duluth.

Buys War Materials

Paris, May 28.—(By special cable)—The French government has announced formally that wartime restrictions upon imports of iron, steel and nonferrous metal products have now been removed. The French also have purchased the very considerable stores in Europe of American war materials of all kinds.

Bars Moving More Freely

Numerous Contracts Closed and Large Tonnage Under Negotiation—Implement Manufacturers Buying—Reinforcing Steel Firmer

Chicago, May 27.—Much better sentiment exists in the finished steel market and soft steel bars are being taken in better tonnage than has been the case for many weeks. Consumers apparently feel that the bottom has been reached and that they can gain nothing by further waiting. One important interest has found the past week the best it has experienced since the armistice was signed. Although buying is somewhat better, it is not yet up to what might be called normal, but with the large tonnage now under negotiation business is expected to be heavy within a short time.

Bar iron continues firmly held at 2.50c, Chicago mill, with comparatively small demand and only for prompt shipment. The bar iron situation depends largely on railroad requirements which are practically nothing at the present time. The prevailing price barely covers costs on the base sizes, but allows a modcrate profit on extras for other sizes.

Demand for hard steel bars is slow, but improving gradually, agricultural implement makers taking almost nothing in this line and reinforced concrete builders only a little. The most active outlet for this material now is to manufacturers, especially those fabricating metal beds.

Consumers Show More Interest

New York, May 26.—A particularily encouraging feature in the eastern bar iron market is the increasing interest of consumers. While little business is being placed for distant delivery, consumers are asking for prices on future iron. Sentiment is strong. Actual trading, however, can still undergo considerable improvement. Some instances are reported of sellers making guarantees against declines, but these interests are known to be offering contracts subject to any change in market prices.

A new plant to be built in Brooklyn by H. W. Cotten, Inc., will require about 4000 tons of bars.

Good Tonnage Being Booked

Philadelphia, May 27.—Steel bars continue to be the particularly bright spot in the market. A fairly large business is being transacted both for spot and future delivery. Third quarter contracts booked the past week involve many thousand tons. While the most important mills are upholding the 2.35c Pittsburgh price, reports of shading have been a disturbing factor. As an example, one mill in taking orders for spring bands quoted the bar basis. Prospects for an improvement in reinforcing bars are good. A large tonnage will be required for the projected Ritz-Carlton hotel at Atlantic City. Bar iron demand is quiet. Most of the mills continue idle by reason of the strike. One large maker who by reason of the strike has been unable to keep his stocks replenished, is requesting his customers to take steel instead of iron bars. Nut and bolt demand is quiet. Practically only the shipyards are buying.

Bar Bookings Much Heavier

Pittsburgh, May 27.—Bookings of merchant steel bars are materially larger than recently and while the bulk of the orders are for prompt shipment some consumers are placing third quarter requirements. Export demands are reported by some makers to be quite large and the agricultural implement manufacturers as well as the makers of nuts, bolts and rivets also are freer buyers. Business, however, is not particularly well distributed among the various makers and in explanation it is said that some of them are filling orders that have been on their books for some little time, even as far back as 1915. They are averaging the price at which this business was booked with that ruling today and the average consequently is below the present market. Inquiries for concrete reinforcing bars are numerous and sales more frequent and of larger tonnages. It is claimed prices on these bars are being well maintained. Demands for iron bars are somewhat more numerous but buyers still pursue a hand-to-mouth policy.

Contracts Are Closed

Youngstown, O., May 27.—A demand for soft steel bars has sprung up in this district. The practice followed recently by large bar consumers was to purchase their supply as they needed them. There now seems to be an inclination to close some contracts. One large barmaker closed recently contracts for 3000 and 6500 tons respectively of bessemer soft steel bars for third quarter delivery. The bar market throughout the valley shows a better tone, several mills being fairly well booked over the third quarter.

Implement Makers Take Bars

Cleveland, May 27.—Further disposition to enter into contracts for bars for third quarter is being shown by manufacturing consumers in this territory. Several contracts involving fair sized tonnages were closed during the past week. These included some business by farm implement manufacturers. Specifications against old commitments have increased considerably, and the whole tone of the market has improved. A sizable tonnage continues to be represented by pending inquiries for reinforcing bars. The Paul building, this city, which is now being figured, will require from 500 to 1000 tons. The Carmichael Construction Co. has the general contract for a public garage at Akron requiring 600 tons. The Goodrich Rubber Co. work in that city, about 2500 tons, still is pending. Reinforcing bars are firmer and some of the rerolling plants will not entertain business at present under 2.25c, Pittsburgh.

Bolt Demand Steady

Chicago, May 27.—Demand for bolts and nuts is holding up fairly well, although not as strong as was the case earlier in the year. Most buying now is from hand to mouth but mills are in possession of a comfortable backlog of old orders on which deliveries are being made. Prices are unchanged and steady.

Demand for Bolts is Good

Pittsburgh, May 27.—A substantial increase has developed in the demand for bolts particularly from the agricultural implement manufacturers. Orders for nuts however, are limited and no appreciable improvement is observed in the demand for rivets. In the lack of any material easing of prices of either bars or rods, current prices are well maintained.

Hoops and Bands Fair

Pittsburgh, May 27.—Makers of hoops and bands in this district are in receipt of a fair number of orders, but buyers are not anticipating their requirements to any considerable extent and shipping instructions frequently accompnay all purchases. Most makers are holding firmly to a base of 3.05c Pittsburgh for both hoops and bands but reports still are current of some shading.

Small Increase in Shafting

Pittsburgh, May 27.—Slightly larger orders are being received by the makers of cold rolled shafting but the gain is not sufficient to bring about any material increase in mill operations which still hover around 50 per cent. No important shading is observed.

More Tonnage

Being Taken Against Semifinished Contracts—Rod Lots Are Placed

Pittsburgh, May 27.—Orders before the makers of cold rolled strip steel have increased materially in the past week or so and some manufacturers say their bookings now are 25 per cent greater than a month ago. The chief demand still is from the automobile manufacturers. Business in hot rolled strip is rather spotty, some makers reporting orders as good, while others say they are small. Some irregularity is noted in the prices on both grades but business below the regular bases is hardly sufficient to warrant lower quotations.

Specifications Are Freer

Pittsburgh, May 27.—While new business in billets and sheet bars is not particularly heavy, specifications against existing contracts are coming along more freely, due to the fact that both sheet mills and makers of bars have recently experienced some expansion in orders. A fair business also is developing in wire rods, due to the improvement in the wire products situation, while a few export inquiries also have been received, some of which have resulted in sales. It is claimed that prices are not being shaded, and in view of the fact that new orders in most cases involve small tonnages, there seems to be ample basis for such a claim. Export demands for all kinds of semifinished material are good, but with prices practically on the domestic basis and showing only a slight margin of profit

some manufacturers are not particularly keen for overseas business.

Bessemer Sheet Bars Sought

Youngstown, O., May 27.—A good demand for bessemer sheet bars exists in this district, the sales of this product topping those of the open-hearth grade. About 100 tons of sheet-bar croppings, some of which average 3 feet long, are being offered by a large jobber in this district. Quotations are at $22 per ton which seems to be the average market price of this product here.

Mills Get More Tonnage

Cleveland, May 27.—Specifications against semifinished contracts especially in sheet bars are heavier and new business is a little better though in small lots. Local producers have large tonnages under contract awaiting specifications. The McKinney Steel Co. now is operating seven out of 12 open hearths, a slight gain. Local rod users have been placing some forward tonnage and one lot of 4000 to 5000 tons has been closed.

The March net operating income of the Gulf States Steel Co. was $67,124 compared with $80,839 in February and $57,241 in January, making a total for the first quarter of $205,204.

Battleship Plates Bid on

Pending Contracts Call For Two Vessels Requiring 25,000 Tons Each—Plate Prices Show Range in East—Export Tonnage Being Figured

Philadelphia, May 27.—Although somewhat improved, plate business is not nearly as active as bars. There are rumors that buyers other than the American Locomotive Co. have been able to buy at 2.50c Pittsburgh and it is reported that even lower was done in one instance but this is unconfirmed. On the other hand at least one 2000-ton lot was placed at 2.65c Pittsburgh and other smaller tonnages of considerable total at the same figure, whereas the Lukens Steel Co. which recently advanced to 2.75c turned down one lot of 2000 tons at 2.65c. The biggest plate business in immediate sight is the tonnage for two battleships on which the bids were taken last week. Each of these vessels aside from the armor plate requires about 25,000 tons of plates, shapes and bars. Platemakers are watching Washington as the most promising buying source as they expect huge tonnages will be required for many ships to be built for the navy.

Price Shading Exceptional

New York, May 26.—Although the American Locomotive Co. two weeks ago bought approximately 3000 tons of plates for 150 Italian locomotives at 2.50c, Pittsburgh base, this figure appears to be exceptional. Four companies shared the tonnage placed by the locomotive company, but it is said that none of them has taken any other business at less than 2.65c, Pittsburgh, which is the level quoted since March 21 by the entire trade. Instead of being weaker as a result of the locomotive company's purchase, the market seems to reflect a firmer tone. One lot of 2000 tons was placed at 2.65c, Pittsburgh, and another of 2000 tons was offered to an eastern mill at the same figure but refused because the latter is holding for a higher price. The interesting fact has just developed that following the final recent conference with the steelmakers in New York, when the railroad administration reiterated its dissatisfaction with prices, the latter placed 6000 tons of plates at full prices with the Steel corporation covering barges for the New York state canal. Although no large single tonnages are reported, plate business here has been good lately. Several platemakers say that May is proving the best month of the year. They now are getting more business proportionately from the New York district than from elsewhere. The plate market continues to be quoted at 2.65c, Pittsburgh, or 2.92c, New York.

Slow in Swinging Into Line

Pittsburgh, May 27.—No marked improvement has taken place in the demand for plates with manufacturers in this district. This product is described as being one of the dullest of the list and manufacturers have much trouble in maintaining steady mill operations.

Business Improving at Buffalo

Buffalo, May 27.—The plate business is looking up. One mill has received two 1500-ton inquiries. This interest has a plate mill now working to capacity.

Tonnage Desired for Export

Cleveland, May 27.—Some good sized plate orders for export work are under negotiation in this territory. One of these involves about 3000 tons chiefly plates with some shapes, for 10 fishing trawlers believed to be for European delivery. Another proposition represents about 4000 tons for a large number of locomotives for South America.

Ship Tonnage Received

Chicago, May 27.—Formal release of about 8000 tons of plates and other ship material has been received by the leading interest as a result of the government ordering ahead two ships at a Pacific coast yard, which had been held up since the armistice.

Wire Trade Much Better

New Tonnage Best Since Armistice and Represents 85 Per Cent of Capacity—Some Contracts Placed to Jan. 1

New York, May 26.—Wire manufacturers report a greatly improved tone in the market, as well as a big increase in business. Buyers are showing more interest and many have placed orders for forward delivery. Business of this character is coming from manufacturers and merchants, but principally from the former. Included is one large tonnage of rods for a rivet manufacturer, and another of rounds for a screw maker. The improvement is not confined to any classes of material, but is general, and is based on the growing belief among consumers that prices may go higher rather than lower. Contracts that are being placed are coming voluntarily from the buyers. Present prices are being obtained both for prompt and contract deliveries, the only exception being in the case of a few products like spring steel, the manufacture of which has been inaugurated by some mills which have not made these products before. The latter are shading. New business is coming in to the principal manufacturers at the rate of fully 85 per cent of capacity. By "capacity" the manufacturers have in mind a somewhat more comfortable normal figure than the unprecedented daily production during the war. What now is regarded as capacity is approximately 85 per cent of the daily production during the four months prior to the armistice.

Business Still Gaining

Pittsburgh, May 27.—Both orders and specifications for wire products still are on the increase and while nails stand out conspicuously in the dealings, business is well distributed. Prices are well sustained, reports of concessions being denied. Apparently the market is not well defined on cement-coated nails as reports continue to be heard of business at less than the regular base of $2.85 per count keg, Pittsburgh. Mill operations do not reflect the increased business because practically all manufacturers had built up warehouse stocks and these now are being drawn upon to meet a considerable portion of the current demand.

Buffalo Mills Still Rushed

Buffalo, May 27.—The wire market is brisk. One local mill has been running at capacity, day and night, since last fall, turning out 150 tons a day. A nail plant which has been running at capacity since last fall is still in full operation and is making 1200 kegs a day.

Orders are Much Better

Cleveland, May 27.—Both new buying and specifications for wire products have continued to increase. The leading producer now is operating his plants in this territory at 80 per cent of capacity, and outside plants at 75 per cent. Manufacturing consumers are more willing to contract and a number of tonnages of this character have been closed to Oct. 1 and in some cases to Jan. 1. Jobbers also are buying more freely and are specifying in larger volume as is also the manufacturing trade.

Shape Demand on Increase

New Negotiations Represent Heavy Tonnage—Various Awards Being Made—Chicago Bringing Out Numerous Projects

Chicago, May 27.—Constant increase in the number of projects requiring structural steel is noted and the number being closed is decidedly on the increase. Prospective business which is being figured promises to give a heavy tonnage for the latter part of the year and fabricators are preparing for a rush of business. Figures will be taken shortly on about 3000 tons for a new building for the John Crerar library at Chicago and the same tonnage for the Webster hotel at Chicago. Plans are ready and bids will be asked within a few days on about 2400 tons for a double deck bascule bridge at Wells street, Chicago, while bids have been asked on 4500 tons for the approaches and plazas for the Michigan boulevard bridge, this city.

Prospects Encouraging

New York, May 26.—The structural market continues to improve and trading in prospect is encouraging. A recent award involves 1250 tons for the Franklin, Pa., plant of the Chicago Pneumatic Tool Co. It is understood that the large plant to be erected in Brooklyn by H. W. Cotton, Inc., New York, will be of reinforced concrete, involving about 4000 tons of bars. No action has been taken so far on 1500 tons for a candy factory for the Park & Tilford Co. A lot of 2500 tons for a candy factory also to be built at Long Island City by George W. Loft, is pending.

Tonnage Not Heavy

Philadelphia, May 27.—Eastern mills report that the improvement in shape business continues to be maintained, but the total tonnage placed is not heavy and does not compare with the bar business. The mills are wondering what has happened to the 6000 tons of shapes on which the railroad administration recently took bids and regarding which it will give no information.

Demands Are Larger

Pittsburgh, May 27.—Demands upon the makers of shapes are somewhat larger than they were a short time ago. Competition among fabricators for a share in the increased construction work is sharp, and these interests are said not to be paying much attention to profits or overhead. Plain material, however, is firm. Structural awards made during the past week include about 1200 tons to the American Bridge Co. for the plant extensions at the Pittsburgh Crucible Steel Co., Midland, Pa.

Fair Volume at Cleveland

Cleveland, May 27.—Contracts for some fair-size tonnages of structural rails have been let in this district, but the total is not so great as in the preceding week. The Massillon Bridge Co., Massillon, O., obtained the contract for supplying 2000 tons for the bar mill building for the Central Steel Co., Massillon. The Bethlehem Steel Co. will supply 1100 tons for the department store of the Ernest Kern Co., Detroit. The Procter & Gamble Co.'s building in Cincinnati, was let to the Toledo Bridge & Crane Co., and will require 300 tons of Bethlehem shapes. The Cleveland Worsted Mills Co. needs 500 tons for its new building in Akron, O. Excavating is progressing for the new Hanna building and it is understood that bids on 2500 tons will be taken in June. The Trumbull Steel Co., Warren, O., has received 2000 tons for extensions.

CONTRACTS AWARDED

Department store for Ernest Kern Co., Detroit, 1100 tons, to Bethlehem Steel Co.

Building for Procter & Gamble Co., Cincinnati, O., 300 tons, to Toledo Bridge & Crane Co.

Bar mill building for Central Steel Co., Massillon, O., 2000 tons, to Massillon Bridge Co.

Hotel Steubenville, O., 650 tons to the Bethlehem Fabricators, Inc.

Building for Bailey, Balk & Biddle, Philadelphia, 400 tons general contract to Irwin & Layton.

Cowell & Hubbard building, Cleveland, 800 tons, general contract to John Gill & Sons.

Highway bridge over Deschutes river at Delles, Oreg., 150 tons, to the McClintic-Marshall Co.

Plant of the Chicago Pneumatic Tool Co., Franklin, Pa., 1250 tons, to the Lackawanna Bridge Co.

Highway bridge in South Carolina, 300 tons, to the Southern Bridge Co.

School buildings No. 80 and 100 in Brooklyn, 700 tons, to the Eastern Steel Co.

Plant extension, Pittsburgh Crucible Steel Co., Midland, Pa., about 1200 tons to the American Bridge Company.

Randolph street viaduct, Chicago, 470 tons, to the South Halsted Street Iron Works.

Building for the McDonald Chocolate Co., Salt Lake City, Utah, 300 tons, to reinforced concrete.

Oregon-Jackson street bridge, Oshkosh, Wis., 233 tons, to the Wisconsin Bridge & Iron Co.

Municipal power plant for the city of Hibbing, Minn., 108 tons, to the Minneapolis Steel & Machinery Co.

CONTRACTS PENDING

Factory addition for Grabler Mfg. Co., Cleveland, 175 tons, bids being taken.

Building for Cleveland Worsted Mills Co., Akron, O., 500 tons, bids being taken.

Extensions to plant of Trumbull Steel Co., Warren, O., 2000 tons, inquiry is revived.

Building for United States Light & Heat Corp., Niagara Falls, N. Y., 100 tons, bids being taken.

Candy factory for Park & Tilford, New York City, 1500 tons, bids being asked.

Building for the John Crerar Library, Chicago, 3000 tons, bids to be asked soon.

Webster hotel, Chicago, 3000 tons, bids to be asked soon.

Bridge for city of Chicago at Wells street, double deck bascule, 2400 tons, bids being taken.

Approaches and plazas for Michigan boulevard bridge, Chicago, 4500 tons, bids being taken by Great Lakes Dredge & Dock Co., general contractors.

Sheet Demand

Continues to Grow but Mills Slow to Increase Operations

Pittsburgh, May 27.—While operations of sheet mills in this and valley districts show no perceptible increase it is not because of lack of business. Orders have shown a further substantial gain with notable increase in jobbers' requirements. Manufacturers, however, have not accumulated much of a backlog of reserve orders and hesitate about speeding up mill activities until assured of more business. Current business is well distributed among the various kinds of sheets. Less talk of price cutting is heard and where it is being done it amounts merely to remission of extras or extremely slight concessions, this having no bearing on the general price situation.

Orders Are Small

Youngstown, O., May 27.—No large orders for any grade of sheets have come out this week, buyers continuing to specify against requirements which means small volume buying. However, mill operation is holding around 65 per cent of capacity. One maker closed an order for a carload of galvanized which is to be shipped immediately to a Pacific coast jobber. The Erie railroad came into the market this week for 100 tons of heavy gage black to be used for box car ends.

Demand is Increasing

Chicago, May 27.—Inquiry and buying of steel sheets is on the increase, orders being for small tonnages and all for prompt delivery, with practically no contracts for remote delivery being booked. The increased demand is coming from manufacturers in general, indicating heavier demand for the products into which the sheets enter. The leading independent in this territory is operating its sheet department practically full and finds conditions much improved. While most sellers are maintaining prices, some concessions have been made here and there to obtain business. This is understood to have been done to a greater extent in this market than in others.

Tin Plate Orders

Fairly Good, but Mill Operations Are Still Very Light

Pittsburgh, May 27.—While current orders for tin plate are fairly good, and one manufacturer reports an order for 6000 base boxes from a small can manufacturer, transactions usually involve small tonnages. Mill operations remain below 50 per cent of capacity. The fact that the growing season has been backward practically all over the country and present stocks of canned goods are large prevents the trade from becoming unduly optimistic. It is believed the pack will be at least 70 per cent of normal for the reason that it is expected a good many truck growers who have failed to come to an agreement with packers on prices will plant the usual area on the expectation if turning the crops over profitably.

More Business Placed

Youngstown, O., May 27.—More interest is being shown in the tinplate market right now, buyers placing orders in good-size quantities. Most of the business is being done with large packers in the Pittsburgh and Chicago districts.

Growing Market for Steel Exports

Foreign Inquiries for American Rails Stimulate Strength of Prices—Stupendous Belgian Requirements Are Under Negotiation—English and American Railmakers Reported Near an Agreement—Meeting Needs of Foreign Credits

NEW YORK, May 26.—Continued increase in exports has prompted merchants here to describe this as a growing market. The larger volume of inquiries from abroad which were noted last week is beginning to show results. While purchases are still made to meet only current needs, there is a favorable sign in that these purchasers are finding a way to finance themselves.

The most important future business now under negotiation is that with Belgium, which country is making inquiries for large quantities of car wheels, steel billets and similar supplies. But the ravages of war as shown in the case of Belgium were extremely severe. Belgians cannot purchase unless they are given credit for a year or two. The house that is able to supply this enormous credit will be the only one capable of writing the business. Even England has not escaped the necessity of finding money, and the small sales now being negotiated with the British call for credits varying anywhere from 90 to 120 days.

According to some prominent steel men, the important Belgian sale will not be negotiated until after Germany signs the peace treaty and makes the first payment on the indemnity. This means that the purchases which the Belgians desire to make involve such a large volume of money and credits that no single financial establishment in the United States desires to enter into it at this time. Upon the basis suggested in the present instance Belgium would require a credit of two years and American manufacturers apparently do not wish to tie their capital up that long.

New Export Arrangements

To a limited extent American banks are now stepping into the breach, and more money apparently is available to finance export transactions in a private way. Within a month or so, it is hoped a still greater volume of money will be put at the disposal of the export business. During the week the National Association of Manufacturers announced the creation of an export organization to sell the products of their members in South America.

These preparations for an enlarged export business have already shown some results. Whereas the business for some time past has been limited largely to light goods, the inquiries from abroad now seem concerned largely with railway materials. India has approached the market with an inquiry for 90,000 tons of rails, although export houses are inclined to believe that this is an exaggeration of India's needs. Scotland has inquired for 10,000 tons of rails, Belgium for approximately 3600 tons, and Italy for 5000 tons. Many inquiries for cars and locomotives also are in the market.

Further confirmation of the export agreement which is reputed to be under negotiation between American and English steel producers was heard during the week. The consensus of opinion is that such an agreement, if entered into, will be limited to rails and that it would be but temporary, or at least no longer than the time when France and Belgium begin to produce rails for export. That such negotiations have been under way seems to have been proved by the volume of inquiries and purchases recently made in this market by other countries. Foreign buyers must feel that the time is growing short during which they will have an opportunity to "bargain hunt" for their requirements in this line.

Many details remain to be worked out before any of these inquiries will be turned into business. In the case of Belgium, for instance, the public business will be negotiated through the agency recently appointed to take over the work of the Hoover commission. The relief commission operated by Mr. Hoover was and is concerned almost exclusively with food requirements. Now it is reported that through this same agency established in the United States the Belgium government will let its contracts for iron and steel and such similar products as will be required to restore public works.

Italy has made an inquiry for an unlimited quantity of melting scrap. The inquiry, stated, however that a very low price must be had. Latin-America is sending in a greater volume of inquiries. Its wants appear to be sheets, tin plate, bars, wire-mill products and pipe. They are mostly for replenishing stocks, and all call for extremely prompt shipment. These inquiries are being turned into orders.

South America has purchased about 200 tons of galvanized sheets at $5.60 f.o.b. Pittsburgh. There have also been some sales of tool steel and of machinery to South America, likewise railway equipment and rails. A sale of 2400 tons of open-hearth rails was noted. It is understood that these were closed at $51, f.a.s. New York. Bessemer rails for export are selling for $2 less than open hearth. The price at which the South Americans obtained these rails will no longer prevail, it is felt by the export houses as there has been an indication of a sharp advance within the past week.

A more recent inquiry for rails from Japan brought forth a quotation of $56.25 f.a.s. New York. This same price was quoted on an English inquiry. The Japanese inquiry was for 500 tons of 14-lb. rails and 700 tons of 50-lb. rails. The English inquiry was for nearly 3000 tons of heavy rails varying from 50, 60 to 80 pounds. Accompanying these were inquiries for the complement of splice bars, bolts and nuts. In each case the inquiries were for open-hearth rails. One lot of 10,000 tons of rails has just been shipped to Japan and another of 10,000 tons is pending. Japan has placed 4000 steel wheels and is figuring on an equal number.

While it appears that there has been an increase in the quotation on rails, due undoubtedly to the heavier demand both at home and abroad, the export houses report that the prices of nearly all other products are less than the domestic market when intended for shipment abroad. The open market has resulted in weaker prices generally, it being declared on one hand that most any product for export can be purchased at approximately 5 to 10 per cent less than the domestic level. Many new inquiries from the Far East for tin plate have developed and a quotation 25 cents under the market has been submitted on practically all . This would make the price $6.75 per base box, Pittsburgh. One of the far eastern inquiries called for 200,000 pounds of tin plate. A sale of 2200 cases of tin plate to Japan was noted, as well as 150 tons of galvanized wire. While the seller did not disclose the exact figures, it is known that these sales under the market. Japan has made inquiry for 200 tons of copper. China has given orders for some small tonnages of wire and similar goods.

Scandinavian Orders Grow

Denmark has purchased 500 tons of bar stock. Sweden wants 20 tons of copper. In general business with the Scandinavian countries has been good. An order for 200 tons of plates was noted. These sold for $2.82, f.a.s. New York. The improvement in the Scandinavian business is probably due to the encouragement given by the better shipping conditions. Rates to most of these ports have decreased slightly. The charge for shipping to Christiania is now $190 per 100 pounds, to Copenhagen $1.25 and to Rotterdam $1.50.

The ocean rates to most all other ports of the world have remained stationary although freight agents declare they see a tendency downward. The charge on close steel to Australia and New Zealand today is $15 a ton and $18 on packed steel. To Singapore the rate is $20 a ton and to Calcutta it is $1 per 100 pounds. There does not appear at present any difficulty in obtaining cargo space in general although the freight agents declare that this is due to the small volume of export steel.

Talk of Inquiry Into Rail Prices

Reported at Washington, Director Hines May Urge Attorney General to Look Into Uniformity of Quotations—Such Action Would Open Whole Industrial Board Plan and Procedure—Congress May Take a Hand

WASHINGTON, May 27.—Investigation of the action of steel manufacturers in submitting uniform bids on rail tonnages sought by the railroad administration and on plates, shapes and bars by the navy department is expected to be undertaken by the department of justice or by congress, or perhaps by both, according to indications here. Such action by the government would open wide the negotiations of the steel industry with the industrial board of the department of commerce in co-operating under the board's plan to stabilize prices and to stimulate industry. At this time no official can be found who will discuss the possibilities of such an investigation.

Director General Hines of the railroad administration, in finally accepting bids on 200,000 tons of open-hearth rails at $47 per ton, the industrial board's approved price, charged the steel producers had combined under the leadership of the United States Steel Corp. to maintain inflated prices. His accusation of a possibility discussed by Attorney General Palmer in his opinion on the board's steel price negotiations, was followed immediately by a report that the railroads' head was urging the justice department to probe the steel men's action. This report has not been confirmed.

May Decline to Investigate

If the attorney general declines to investigate, as some are inclined to believe, then congress may. The day following announcement that he had accepted under protest the $47 quotation on rails, Mr. Hines formally asked congress for an additional $1;200,000,000 with which to make purchases, pay the administration's debts and operate the railroads for the remainder of 1919. When congress takes up this request, it is expected the steel price question will be fully discussed.

Either investigation would likely bring up the phase of the question concerning the navy's receipt of uniform bids on the tonnage recently covered in a requisition upon the Carnegie Steel Co. It was because of the uniformity of bids that the navy, in order to benefit from funds already authorized by congress, decided to exercise its war powers and commandeer the steel. The price the navy will pay has not been determined and before that is done much else may transpire in a thorough probe of the activities of the industrial board.

That the industrial board's very existence, first approved by the President and practically the entire political administration, would prevent any punitive action by other governmental departments is pointed out by those who do not believe congress or the attorney general will investigate the director general's charges. The board, officially reprimanded by the President for having strayed from the course originally planned, was so much a creature of the government that any action taken by the steel manufacturers under its guidance would absolve the industry from any legal questioning, according to the opinion of some.

However, it is the action of E. H. Gary, chairman of the Steel corporation and spokesman for the industry in its dealings with the industrial board and with the railroad administration, which incited Director General Hines to make his charges of a possible combination. The director general said "Judge Gary for the Steel corporation took the initiative in announcing publicly that the Steel orporation was strictly maintaining the prices approved by the industrial board and that it seemed to him that would also be the attitude of other manufacturers."

Hines' Orders Are Surprise

While interest is being maintained in the possibilities of an investigation, surprise has been expressed that Mr. Hines, if he so much disapproved the prices, would consent to place an order for rails at that quotation. His course indicates, however, his total lack of commandeering powers and also the absolute need of the administration for steel rails. It is now estimated that fully 1,000,000 tons of rails will have to be purchased by the administration to restore the railroads to the average condition during the three-year test period.

In awarding the contracts for the 200,000 tons, Mr. Hines divided it equally between Steel corporation subsidiaries and independent producers. The corporation's share goes to the Carnegie Steel Co., the Illinois Steel Co. and the Tennessee Coal, Iron & Railroad Co., the only corporation interests participating in the bidding. What proportion of the 100,000 tons goes to each company has not been disclosed. The Bethlehem Steel Co. and the Lackawanna Steel Co. are to furnish 40,000 tons each and the Colorado Fuel & Iron Co. is to manufacture 20,000 tons. The Midvale Steel & Ordnance Co., which submitted a bid of $55 and $57 for bessemer and open-hearth rails respectively, will not participate in the award.

Hines Says Corporation Keeps up Price

MR. HINES in his public statement regarding the purchase of rails charges that the Steel corporation through its influences upon either producers is responsible for the uniform prices quoted. He says:

When the industrial board approved the prices proposed by the steel interests it became at once apparent to me and I so indicated in various discussions with representatives of the government that that approval would encourage the steel interests to stand together on those prices even though governmental approval was withheld. I felt, however, that even so it would be far more in the public interest for the government to withhold approval and if necessary pay such prices, for the time being, under protest rather than endorse the prices, and that too for the entire calendar year, as was proposed by the industrial board and thereby given an official sanction to prices which were unreasonably high and which would merely serve as a starting point for still higher prices later on.

The result has been in exact accordance with this forecast. Six of the leading steel interests, in response to the railroad administration's request for bids for steel rail have submitted bids which are uniform in all respects as to prices and conditions of manufacture and are in strict accordance with the prices proposed to and approved by the industrial board. In view of the immediate need for 200,000 tons of steel rails, orders have been placed at the price thus indicated, that is, $47 per ton for open-hearth rail, for that quantity with the Carnegie Steel Co., the Illinois Steel Co., and the Tennessee Coal & Iron Co., all of which are subsidiaries of the United States Steel Corp., and with the Colorado Fuel & Iron Co., the Bethlehem Steel Co. and the Lackawanna Steel Co. This action is taken not only without

approval of the prices but for the reasons shown below with emphatic disapproval of the prices and the manner in which they have been established.

That action of these six steel companies in making uniform bids was taken under the leadership of the United States Steel Corp. is clear from the fact that immediately after the railroad administration announced finally that it would not approve the prices fixed by the industrial board, Judge Gary for the Steel corporation took the initiative in announcing publicly that the Steel corporation was strictly maintaining the prices approved by the industrial board and that it seemed to him that would be the attitude of other manufacturers. The subsequent action of the Steel corporation and the other manufacturers in submitting their bids has accorded completely with Judge Gary's announcement.

Points to Steel Profits

The Steel corporation's annual report to its stockholders shows that after paying all wages and other operating and maintenance expenses and allowing most liberally for renewals and paying interest on debt of subsidiary companies and also taxes other than war taxes and excess profits taxes it had net earnings on all rolled steel products of $21.58 per ton in 1916, $35.73 per ton in 1917, and $33.53 in 1918. It is a remarkable fact that in the calendar years 1917 and 1918 the net earnings of the Steel corporation aggregated approximately $1,000,000,000, being in excess of the annual rental which congress has sanctioned as reasonable for practically the entire railroad mileage in the United States. It is true the Steel corporation had to pay out of these net earnings heavy excess profits taxes to the government, but even after paying these taxes, making liberal allowance for depreciation, and extraordinary replacement funds, and after paying interest on bonds and 7 per cent on preferred stock there remained an earning of 39.2 per cent on its common stock in 1917 and 2.2 per cent on its common stock in 1918. The fact that excess profits taxes were paid out of the net earnings in 1917 and 1918 does not in any way detract from the accuracy of those net earnings as a measure of the productiveness of the war prices which were charged by the Steel corporation.

These figures of actual net earnings per ton on the entire output of the Steel corporation are much more convincing than estimated costs of rolling a particular steel product at a particular mill. The estimated costs may show the greatest variation but the ultimate result is an enormous profit to the stockholders of the corporation. The claim that the wages of labor would be endangered by a reasonable price on steel is therefore not convincing.

Heavy profits are not confined to the Steel corporation. It appears that the net earnings of the Lackawanna Steel Co. were $12.40 per ton in 1916, $24.81 in 1917 and $19.88 in 1918; of the Republic Iron & Steel Co. were $13.88 per ton in 1916 and $25.92 in 1917, and its profits for 1918 are not yet available; of the Colorado Fuel & Iron Co. were $9.57 per ton in the year ending June 30, 1916, and $13.91 per ton in the year ending June 30, 1917. The Bethlehem Steel Co. furnished no reports that give any information as to the profits per ton. In considering all these profits it must be remembered that the reductions from war prices which were proposed by the steel interests and are now being adhered to by them as the greatest reductions they are willing to make are practically completely offset by the great fall in the price of scrap iron alone (which can be and is used largely as a substitute for pig iron in the manufacture of steel) without regard to the various other reductions in cost which are coming about as a result of readjustment to peace conditions.

Discusses Midvale's Higher Bid

A seventh steel company, the Midvale Steel & Ordnance Co., in response to the request of the railroad administration for bids proposed prices $10 in excess of the prices proposed by the other six companies. It is interesting to note that the company which made this proposal showed on all its steel products net earnings in 1916 of $24.62 per ton, in 1917 of $44.23 per ton and in 1918 of $35.93 per ton. Its apparent position now is that it cannot afford to make any reduction in the price of steel rail without reducing the wages of labor.

It is important to remember that the present policy of the steel interests in adhering to high prices on the ground that the present high costs necessitate these prices is a policy that does not work both ways. It is a policy to keep prices from going higher as business increases and costs diminish. It will be remembered that the industrial board announced that the public could not expect prices to be lower during this calendar year but it gave the public no hope that they would not go higher. The resumption of business in the country will probably result in the substantial diminution in the cost of steel production, but unless the attention of the public is constantly centered on the situation there is danger that the steel interests will take advantage of the increased demand to increase the prices of steel still further, even in the face of declining costs.

The situation in the steel industry is of greatest moment to the American public. The United States Steel Corp. is the largest producer and controls approximately 50 per cent of the output. It takes the lead in maintaining a price, which, if its reports to stockholders are reliable, indicates a grossly excessive profit, and it does this for the avowed purpose of protecting alleged high cost producers which, however, so far as they make detailed reports on the subject to their stockholders, also indicate large profits. In other words the Steel corporation appears to take the position that for the protection of other prosperous steel producers it is unwilling to initiate any competition in the steel industry and naturally these other producers are glad to follow this lead, and incidentally this position enables it to continue the enjoyment of very high profits. This condition operates to suspend the law of supply and demand when it could work in favor of the consumer but it leaves that law free to operate with the greatest effect when it can work in favor of the manufacturer. This situation also works to deprive the public of the benefits of the increased efficiency due to the great combinations in the steel business. Those combinations are the result of public acquiescence and yet all the benefits of them go not to the public but to the private owners. The more powerful the combinations become the more successful they are in keeping up prices.

These reasons lead me to reiterate that the prices in question are unreasonably high at present and will become progressively more unreasonable as business improves and conditions become more nearly normal.

Shorter Day

Wanted by Sheet and Iron Workers —6-Hour Day Proposed

Middle western independent sheet and tin plate mills will name representatives shortly to meet with committees of the Amalgamated Association of Iron, Steel and Tin Workers at Atlantic City the middle of next month to discuss the wage scale proposed at the recent Louisville convention of the association. Immediately afterward the bar iron mill representatives will hold a like conference.

At the Louisville convention the puddling mill employes decided to ask for an 8-hour workday and the sheet mill and tin plate workmen for a 6-hour day. Sheet and jobbing mill hands reaffirmed last year's scale but demanded that the list of wages based upon the average selling price of $4.35 per 100 pounds, shall be minimum for the new year; also that all men on sheet and jobbing mills shall receive 25 per cent advance on the base of 1918-19.

The muck mill employes join with the puddlers in asking for a boiling wage scale with no change in the 1918-19 base up to a 1.25c card, but a 5 per cent advance from the 1.30c card up to and including the 1.75c card, and a 10 per cent increase from the 1.80c card upward.

Tin mill workmen have followed the example previously set by the sheet mill men in demanding a higher protective price. They have requested the manufacturers of the Western Sheet and Tin Plate association to agree to a protective price of $7 next year, and maintain that a selling price under $7 per 100 pounds for tinplate will not give the employe a living wage.

Goethals Wins Medal

The John Fritz medal this year has been awarded to Maj. Gen. George W. Goethals in recognition of his achievement in building the Panama canal. The presentation was made May 22 by representatives of the Civil, Mining, Mechanical and Electrical Engineering society, at the Engineering Societies building, New York. The medal was established in 1912 in honor of the late John Fritz, steelmaster of Bethlehem, Pa., and it is awarded once a year. This is the eighth time in as many years that a medal has been bestowed upon Major General Goethals.

Tonawanda Stacks

Passed to Donner Steel Co.—Will Remain Merchant Producers

Ownership of the two blast furnaces of the Tonawanda Iron & Steel Co. at North Tonawanda, N. Y., has passed to the Donner Steel Co. The property has been operated under lease by the Donner Steel Co. for several years past and a privilege of purchase now has been exercised. The output of the furnaces is to be sold as merchant iron as heretofore and will be handled by a subsidiary interest of the Donner company to be organized later. The A Tonawanda furnace was built in 1873 and rebuilt in 1890 and 1891 and is a 76 x 18-foot stack. The B furnace was built in 1895, and is 80 x 18 feet. The furnaces have been producing foundry, forge and malleable iron and have an annual capacity of 180,000 tons. With the acquisition of the Tonawanda plant, the Donner now owns four blast furnaces.

A new 10-inch bar mill at Buffalo also has been put in commission by the Donner company.

Gary States Corporation's Open Shop Policy

Reiteration of the open-shop policy of the Steel corporation is made by Chairman Gary in a reply to a communication from M. F. Tighe, president of the Amalgamated Association of Iron, Steel and Tin Workers.

Judge Gary's reply, dated May 20, is as follows:

"I have read with interest your letter of the 15th inst.

"I agree that it is the patriotic duty of all good citizens to use their efforts in stemming a tide of unrest in the industrial world whenever and wherever it appears.

"As you know, we do not confer or negotiate with or combat labor unions as such. We stand for the open shop, which permits a man to engage in the different lines of employment whether he belongs to a union or not. We think this attitude secures the best result to the employes generally and to the employers.

"In our own way and in accordance with our best judgment we are rendering efficient, patriotic service in the direction indicated by you."

Mr. Tighe wrote to Judge Gary from Louisville, Ky., on May 15 as follows:

"The Amalgamated Association of Iron, Steel and Tin Workers have admitted many thousands of the employes of the United States Steel Corp. to their organization. These members are asking that they be given consideration by the corporation you are the honorable chairman of in their respective crafts and workings and also as law-abiding citizens who desire the privilege of having their representatives meet with the chosen representatives of the corporation you represent to jointly confer on questions that mutually concern both.

"Sincerely believing that the granting of their request on your part will not only be the means of allaying that unrest but will also promote and insure that harmony and co-operation that should at all times exist between employer and employes to the end that all will share in the glorious triumph so lately achieved in the Great War, thereby adding still more to the luster and glory of our common country; trusting that you will give this request on the part of the employes of the aforesaid corporation your most earnest consideration, I await your pleasure."

New England Foundrymen Hold Annual Meeting

Hartford, Conn., May 22.—The New England Foundrymen's association held its annual Hartford meeting here today, as guests of the Hartford members. Although there was a heavy rain all day still nearly 100 members from many parts of New England were here and the interest in the association assumed the usual lively nature. The secretary, Fred T. Stockwell, was unable to be here, and T. C. Wilson, in his place, announced names of two new applicants for membership. These were—the Babcock Printing Press Manufacturing Co. of New London, Conn., and the Springfield Brass Co., of Springfield, Vt. In the evening, Eurique Touceda, consulting engineer, American Malleable Castings association, presented a paper on the manufacture of malleable iron castings; which included a history of the industry, an outline of the work of the American Malleable association, and a description of the present day methods of obtaining high strength and ductility in castings.

Gets French Mill

The Morgan Construction Co., Worcester, Mass., has been awarded a contract for a 12-inch merchant bar mill for export to a French company. The mill will be designed to produce round sections up to 2 inches diameter and other equivalent shapes, and will be installed in a new works at Dunkerque, France.

The Nonferrous Metals

Copper Lead Spelter Tin

	Copper	†Spot Straits, tin	‡Lead, New York basis	Spelter St. Louis basis	Aluminum	Spot antimony
May 21	16.62½	72.50	5.25	6.30	33.00	8.00
May 22	16.62½	72.50	5.25	6.30	33.00	8.00
May 23	16.62½	72.50	5.25	6.25	33.00	8.25
May 26	16.62½	72.50	5.25	6.25	33.00	8.37½
May 27	16.50	72.50	5.25	6.25	33.00	8.37½

†United States Steel Products Co.'s price to consumers, dealers and jobbers.
‡American Smelting & Refining Co.'s price.

NEW YORK, May 27.—The news received on May 21 that the Germans had been granted another seven days in which to make their reply to the allied peace terms, brought a lull in the activity which had been notable in the metal markets. Speculators had accumulated considerable supplies, for one thing, and they were inclined to await the turn of international affairs before committing themselves further. As the week progressed, some of these speculators unloaded a little of their holdings and took their profits, bringing an easier tendency in lead and spelter prices. Today copper was a little weak on account of second hand offerings. However, producers stood firm and the reaction thus far has been slight. The copper market has continued to manifest a firm tone on the part of producers. Consumers of copper are estimated to have bought about 100,000,000 pounds of copper on the present movement. Some good business has been done for export to Japan.

The price of electrolytic copper was 16.50c to 16.62½c, delivered, but a little electrolytic is now being offered by dealers at about 16.25c to 16.37½c, with the market 16.50c New York. The market for casting copper is 16c to 16.12½c New York. Lake copper is quoted nominally 16.75c to 17c, New York.

The tin situation is unchanged, except for increased interest. A statement to the tin trade was made Monday by George Armsby, chief in charge of tin, war industries board. This statement showed stocks of tin, including tin content of concentrates, on May 1, as 22,000 tons. This figure represents all tin in the United States. On May 23, the total unsold tin in the hands of the United States Steel Products Co. was 2199 tons. Average monthly consumption thus far this year was given as 3713 tons. The tin market at London broke sharply last week, following a rapid rise, but today was strong on account of the situation in the United States. Some tin was sold for importation after the import restrictions are lifted, at prices ranging from 52c to 53.50c, c. i. f. New York.

The lead market has reflected better demand and the outside market has been well maintained at prices equivalent to those asked by the leading producer, 5.25c New York, 5c East St. Louis.

The spelter market slowed up considerably the past week. Whereas as high as 6.35c, East St. Louis was done for June shipment, offerings by May 26 were down to 6.22½c and the market today was 6.22½c to 6.25c. On business for shipment after June, a premium of five points a month is asked.

Uncle Sam Operates a Steel Works

Bureau of Standards, Washington, Has Installed Extensive Experimental Equipment Including Sixteen-Inch Motor-Driven Mill, Forging Press, Draw Bench and Electric Furnace—Complete Steel Research Facilities

BY M. L. FEISER

UNCLE SAM'S determination to enter the steel business for himself cannot be said to be due to his composite knowledge of the steel industry as gleaned through his control of it during the war, through his federal trade commission's studies of steel production costs and through his internal revenue bureau's inside information as to steel profits. Rather, his new role as a steel producer is attributed to his desire to be of assistance to industry generally and to his own steel-consuming departments. He has a miniature plant of his own where he can study the business in many, if not all, of its technical ramifications.

This steel plant is located in Washington, where the bureau of standards, which is to operate it, is established in extensive surroundings devoted to the study of metals, their composition and uses. This plant, unlike others in the industry, is not operated for profit. Accordingly, the cost of materials and finished products and the usual business cautions and ambitions will not be factors in the production of steel in this plant except possibly as they may be noted or analyzed for such advice and information as may be imparted to commercial producers.

The basement of the bureau's new metallurgical laboratory houses the plant which is partly ready for business. It is equipped with a 16-inch mill for rolling hot or cold metal, a 150-ton forging press, a 20,000-pound chain draw-bench for rods and tubes, a 500-pound electric furnace, a pickling tank, a quenching pit, several annealing furnaces, a resistance furnace and a 5-ton traveling crane. All except the electric furnace, the resistance furnace and one of the pits have been in operation.

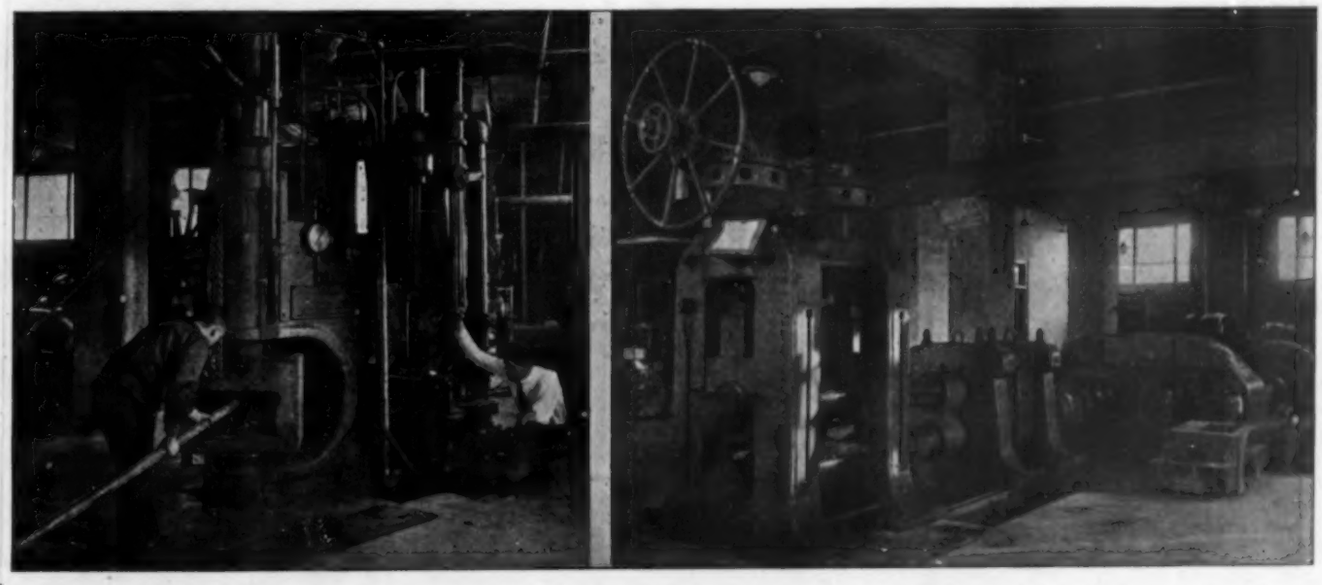
The bureau's plant, again unlike those of commercial steelmakers, is used only intermittently, at such times as a special study of steel is to be made. For this reason, the plant's operators are not concerned with "annual capacity" or "output." Analyses of metals, heat treatment, processes of manufacture, examination of properties and other metallurgical studies are the objects to be achieved.

Planned before the United States entered the war, the plant did not begin to assume its present proportions until last November, about the time the armistice was signed, when the rolling mill was installed. Already the bureau has begun a study of armor steel for the navy department. The rolling mill was built by the Philadelphia Roll & Machine Co., Philadelphia, and can be fitted with either chilled or sand rolls. Grooved rolls have been ordered, widening the scope of production of finished products. The mill is driven by a 150-horsepower motor the speed of which, 250 to 1000 revolutions per minute, is in 4 to 1 ratio with the speed of the rolls.

The forging press is of the combination hydraulic type operated by compressed air which is more adaptable to the bureau's requirements than is a steam press. This is because of the only occasional use to which the machinery it put. This press is the product of the United Engineering & Foundry Co., Pittsburgh, and, according to bureau officials, was one of the first compressed air presses built by that company.

The draw bench was built by the Waterbury, Farrell Foundry & Machine Co., Waterbury, Conn. The other equipment, including the electric furnace, was designed by the bureau's own staff and assembled and erected by its own workmen, the parts being specially made or bought in the open market.

The bureau expects to make metal by commercial processes, to examine its properties, to make tests of army, navy and commercial necessities, and to be of such advisory and research service to steel producers and consumers generally as the demand and available facilities permit.



A HEAVY FORGING PRESS OPERATED BY COMPRESSED AIR IS AVAILABLE AND ALSO A MOTOR-DRIVEN, 16-INCH EXPERIMENTAL ROLLING MILL

Details of Production Department

How Delays and Unnecessary Expense in Manufacture May be Avoided by Efficient Checking of Work at Every Important Stage—Classifications and Details of Modern System Are Explained

BY M. H. POTTER

THE centering of all records and statistical routine in a distinct department leaves the foremen and superintendents freer to do the necessary executive work. To lay out in detail all work to be done in the plant, to keep a perfect record of progress of all work orders, and to keep the executives advised of all conditions requiring their special attention—these are the principle functions and duties of the production department. However, many additional duties are assigned to the department, especially in larger plants where much detail is involved and a definite program must be maintained to assure balanced production. This article deals with the underlying principles of a production department and paves the way for expansions as individual cases may warrant.

The production department is considered by many as engaged solely in keeping a record of actual production by means of various forms and charts. The effective and properly managed production department, however, is concerned with the issuing of reports and orders relating to details of the work in advance, and with the planning to overcome by eliminating many difficulties before the work order is issued.

Not Statistical Department

No doubt, the method of handling production in many shops is responsible for the production department following instead of leading, as many foremen, who consider themselves "victims" of production systems, never have experienced the benefits of well-ordered routing and planning.

Foremen who have had haphazard production systems thrust upon them and have not had opportunities for noting delays in getting out orders and failures to discover shortages until the products have been ready for shipment, cannot but consider the production department merely as the keeper of statistical records and data. Fundamental factors of an efficient production department are shown in Fig. 1. As various manufacturing enterprises differ in methods and operations, so production details will differ. The most important details which must be closely watched to maintain production in one industry, may be ignored in another. It is the duty of the production department to so organize as to foresee and overcome delays in production. It is through the three classifications as shown in Fig. 1 that this important work is successfully accomplished.

A record on which individual production orders may be kept is shown in Fig. 2. This record covers all orders in the shop. A separate tracing and routing sheet is made out for each production order. Each stock order must have a separate tracing and routing sheet, although the stock order may be a repeat order. It is important that the information placed upon this sheet be specific and that it contains the necessary information, as for example: DRAWING. *Sketch*

This is the second article in a series written by M. H. Potter on the application of modern accounting methods in industrial plants.

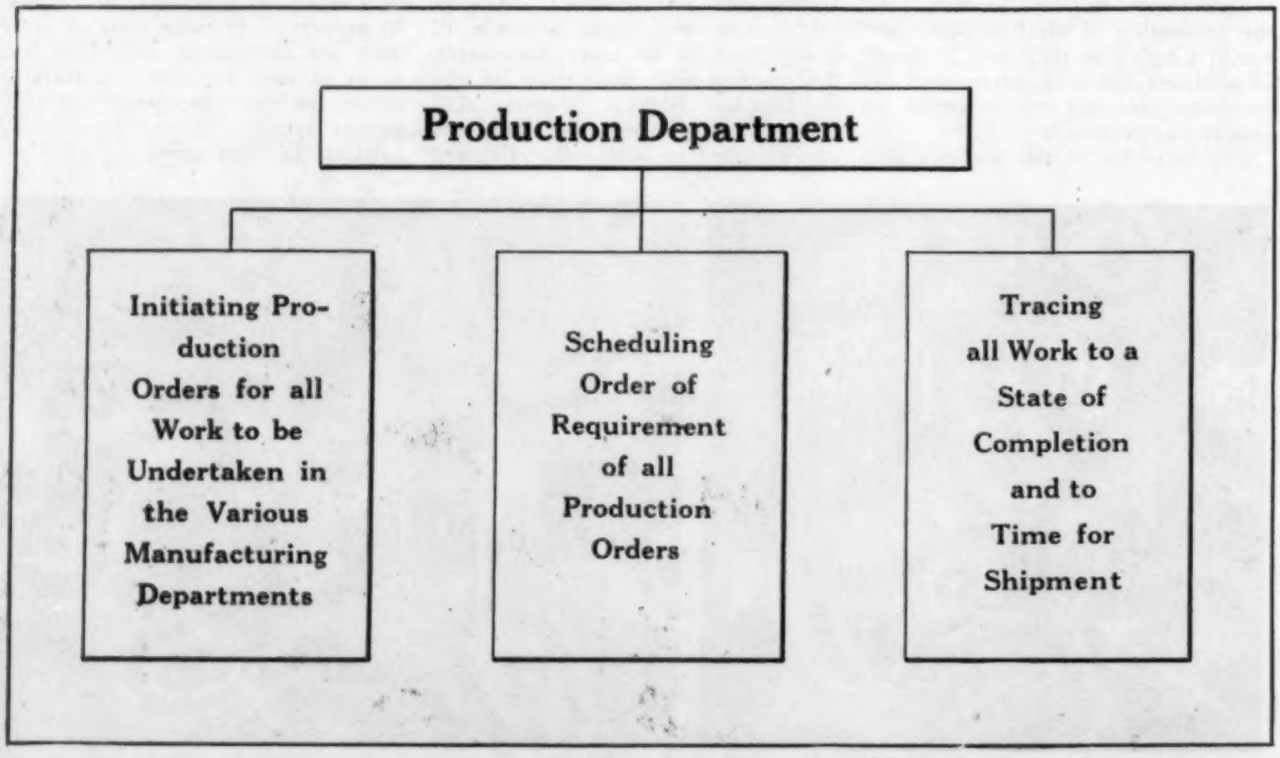

Production Department
Initiating Production Orders for all Work to be Undertaken in the Various Manufacturing Departments
Scheduling Order of Requirement of all Production Orders
Tracing all Work to a State of Completion and to Time for Shipment

FIG. 1—HOW WORK OF PRODUCTION DEPARTMENT MAY BE CLASSIFIED

Tracing and Routing Sheet

Name of Part ..... Date.....
Symbol ..... Drawing No. .....
Material ..... No. Required .....

Drawing	
Pattern	
Material	
Machining Operations	

Completed

By ..... Dept.
Date .....
Production Order No. .....
Sent to ..... Dept.
No. of Pieces .....
Rec'd Pieces .....
Shortage .....
Owing to .....

FOREMAN

FIG. 2—FORM FOR INDIVIDUAL PRODUCTION ORDERS. FIG. 3—NOTIFYING PRODUCTION DEPARTMENT OF COMPLETION OF JOB

sent to pattern shop. Detail drawing for machine shop available 5inst.

A report to notify the production department that a certain job or part has been completed is shown in Fig. 3. The filling in of this form may be understood readily as well as its usefulness. It will act as a guide in the proper direction, although circumstances, no doubt, will permit the printing of definite information and the elimination of the necessity of writing in some of the details. A copy of reports which show shortages due to workman's mistakes should be forwarded to the superintendent in order that proper action may be taken.

The transfer of parts or material in course of manufacture from one department to another should come under the jurisdiction of the production department. The form shown in Fig. 4 is issued to record such movement and should contain enough information to enable the parties concerned to carry out the work or to explain the reason for not doing so. After the orders contained on the form have been executed the form is returned to the production department.

The production tracer shown in Fig. 7 is intended for the tracing of parts which go to complete a machine or other article of manufacture, and will vary with the nature of the work. It enables the executive in the various departments to ascertain how the work is progressing, and by its use the officials may expedite the work which is not progressing. While it is the function of the production depart-

Order to Move Material

Order No. ..... Date .....

Material	Pattern or Symbol	From	To

The Above Materials Have Been Moved as Directed
By .....
Date ....

Purchased Material Required

Date ..... For Production Order No. .....
Required Date .....

DESCRIPTION OF MATERIAL	DATE PROMISED	REPORT ON PROGRESS	
			Date

FIG. 4—FORM FOR TRANSFERRING MATERIAL IN COURSE OF PRODUCTION. FIG. 5—KEEPING A RECORD OF PURCHASES

Weekly Progress Report	
Dept. No. 3 Pattern Shop	Week Ending----------
PRODUCTION ORDERS REC'D	
DRAWINGS RECEIVED	
DRAWINGS REQUIRED	
MATERIAL REQUIRED	
PATTERNS COMPLETED	
PATTERNS REPAIRED	
FOUNDRY EQUIPMENT REPAIRED	
THE INFORMATION AS REGARDS FOLLOWING IS DESIRED	
DELAYS CAUSED BY	
By---------- Foreman	

FIG. 6—WEEKLY REPORTS ON PROGRESS OF MANUFACTURE ARE IMPORTANT

ment to maintain this record, it is the duty of those concerned with the various departments to use the information to avoid delays.

The form shown in Fig. 5 is kept by the production department to have on record the information desired concerning material purchased through the purchasing agent or department. A form of somewhat similar character might be filled in by the production department and forwarded to the purchasing department either when material is urgently needed or when delay on nondelivery occurs. However, the keeping of such a record, in most instances, would not be classed as one of the principal functions of the production department, but rather as an extension or addition to the work required of the department.

The weekly progress report, Fig. 6, is compiled by the production clerks in the various departments of the establishment. The information is of value to those concerned in maintaining the production schedule. Separate forms should be printed for each department, not only for those actually engaged in shop operations but for such departments as purchasing, drafting, stores, etc.

When properly executed such reports are of great value and are the key to the situation from a most practical viewpoint. A study of the existing conditions is necessary to collect the data which should be placed upon this form.

In order that the various forms may be readily available, it is important that the production department not only have an efficient filing system but that duplicate forms be sent to the executives interested. It is by such means of calling attention to delays encountered at various stages of the work that those in charge may overcome them.

Krupps Face Dark Future

The great Krupp works at Essen, Germany, built up mainly on the manufacture of heavy guns, has fallen on evil times. The firm now finds it impossible to keep its army of 100,000 workmen employed, and the men are being discharged in large numbers. The question for the future is the kind of work to be taken up, seeing that the demand for munitions must almost cease in the years immediately before it. Plans are under consideration to build locomotives and to manufacture machine tools. Already, to some extent, the works are being reorganized with a view to the new branches of production. The coming need for railway rolling stock and machinery is recognized, and the firm is hastening to put itself in a position to meet the demand. Meanwhile there is much unrest among the workers, so that the outcome cannot yet be clearly seen. The question is one of vital importance to the iron and engineering industries of Germany. —(*Zeitschrift fur angewandte Chemie.*)

Work of enlarging blast furnace No. 3 at the Farrell works of the Carnegie Steel Co. is so well along that it is expected to be finished by June 15.

Production Tracer

PURCHASED MATERIAL					DRAWING			PATTERN			CASTING		
Date of Req.	Req'n No.	Order No.	Date	Date Rec'd	Date Order	Date Del'ed	Draw'g No.	Date of Req.	Pat. No.	Date Delivered	Date of Req.	Order No.	Date Delivered
1	2	3	4	5	6	7	8	9	10	11	12	13	14

FIG. 7—FORM FOR TRACING OF PARTS ENTERING INTO MANUFACTURE OF VARIOUS PRODUCTS

Method of Charging Blast Furnaces

Operating Irregularities Can be Counterbalanced by Carefully Grading and Mixing the Ore—Removing Coke Breeze Effects Considerable Economy—Larry-Car, Skip and Bell Operation Bears the Closest Scrutiny

BY J. A. MOHR

DURING the early history of blast-furnace operation the method of charging materials was a logical sequence of the other operating conditions. The furnaces were about 30 feet high, and lack of transportation facilities caused them to be located at the ore mines, preferably close to a hill, from which, due to their low height, a platform ran to the furnace top. At first, the quantities of ore, fuel and flux were not measured in any standard way, but were hauled in wagons to the furnace top, and shoveled in according to the individual ideas of the particular operator. Later, scales and hand barrows were installed, and the materials, after being dumped from the wagons, were shoveled into barrows and weighed before dumping into the furnace. Next to the quality of the raw materials themselves, no more important developments in blast-furnace design and operation were found than those dealing with the proper methods of charging raw materials. The approximate quantities of raw material used per ton of iron produced are 4300 pounds ore, 2000 pounds coke, 1000 pounds limestone, and 7800 pounds air, when smelting Mesabi ores.

Method of Charging Air

Many blast-furnace managers have found it to be of advantage to adjust the quantity of air supplied according to the existing conditions of temperature and pressure. This is done by adjusting the revolutions with the existing atmospheric conditions of temperature and barometric pressure, so that the actual pounds of air delivered to the furnace will remain constant. Efforts have also been made to eliminate the irregular flow of air as received from reciprocating blowers, by the use of turbo blowers. The uniform supply of air which they seek to attain is of importance, and their practicability as a blower should receive the attention of every operator. The hot blast main and bustle pipe should be so designed and arranged as to insure a good distribution of air to the several tuyeres. A necessity to accomplish this is the use of clean gas, as dirty gas accumulates dust in the stove, which is carried over and deposited in the bustle pipe, obstructing the uniform flow of the air. The charging of raw materials presents a rather complex problem, the importance of which cannot be overestimated, and is more complex and more important, the less uniform, the less regular, and the less desirable from any point of view, within physical or chemical composition, these materials are, as such irregularities can, to some extent, be compensated for or counterbalanced through attention to the various details of the method of charging, both in engineering and in operating. This is so important that attention must be given the materials almost from the time they enter the blast-furnace plant for proper grading and assorting.

The methods in use by the United States Steel Corp. at the ore mines and docks in grading and mixing the ore are of great value to the furnace operator, and minimize to a great extent the troubles of the operator in this respect. At the mines each car is analyzed before sending to the docks. At the docks the car loads are then distributed to the various bins, according to their analysis. Then the different car loads in the bins are thoroughly mixed in the process of handling into the boats, then to the receiving docks at the lower lakes, and lastly to the cars for their transportation to the furnaces. This method produces grades of ore which are remarkable in the uniformity of their analysis.

The average furnace plant uses several different kinds of ores in its furnaces, and the method of stocking these in the yard should be an object of careful study to the operator. Different ores must be kept separate, and at the same time the full capacity of the stock yard must be utilized so that it is necessary to observe closely the arrangement of the two different ores at their junction. This can be done by keeping the level of both piles as nearly the same as practicable, so that the course pieces of ore cannot run down the pile and across to the other ore. Also, in order to prevent segregation of the lumps, the ore should be stocked in small piles uniformly over the stock pile, and the next cargo should be filled in between these piles; this operation also giving a good mixing to the various cargoes of the same ore and lessens chances of receiving ore of any great variation in filling the bins, either chemically or structurally.

The ores in the yard should be so arranged that those of different chemical composition are not adjacent, but are separated by an ore whose analysis is approximately between the two so that when the ore at the juncture of any two piles is reclaimed it will not vary much in composition from the ore on either side.

For economy of handling, the stock pile should have ample capacity to eliminate handling ore from cars during the winter season because the frozen cars of ore are thawed either by means of steam pipes thrust in them or by burning fires under them. In either case the moisture content of the ores in the cars is changed considerably from the initial amount, and this will cause considerable variation in the actual weight of ore charged as compared with that already in the stock pile, consequently, when part of charge is taken from thawed ore and part from stocked ores, the variation in weight of the metallic contents caused by the different moisture contents, will produce irregular working of the furnace. Where limestone is stocked, similar precautions should be taken to prevent segregation of lumps.

Bins Should be of Ample Size

Most bins are equipped with mechanically operated doors, both steam and electrical operation. Some modern bins, however, still use hand-operated doors. The bins should be of ample capacity to supply the furnace for a considerable period in case of a breakdown on the ore bridge, and for reasons of economy the capacity should be sufficient to hold a 24-hour supply so it will be unnecessary to work the ore bridges at night. They should be located in relation to the furnaces so that the larries will have the least possible length of travel.

The bin doors have a special work to perform, and many cases of poor furnace practice are probably caused by the inability of this part of the ore handling machinery to perform its work

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Abstract of a paper presented at the annual meeting of the American Iron and Steel Institute, New York, May 23-24. The author, J. A. Mohr, is superintendent of Carrie furnaces, Carnegie Steel Co., Rankin, Pa.

in the proper manner. The human element comes in strongly at this point, and for this reason every possible precaution should be taken by the operator, first, to see that the doors will do their work as well as is possible, and second, that the men perform their duty of weighing accurately. Limestone is generally stored in the same type bins as the ore, and causes little trouble in handling, because of its free running qualities. Coke bins are generally separate from the ore bins, as there are different requirements necessary for their operation. Coke will travel freely over a much flatter slope than that necessary for the ore, so that the bins can be made comparatively flat and shallow. In order to mix the different cars of coke thoroughly, and thus eliminate the possibility of receiving different qualities of coke in different levels of the furnace, the bin should have a capacity equal to several cars of coke, and coke in any part of the bin should travel freely, to guard against having dead places in the bin where coke will accumulate for a considerable period of time, and only be used when the bin contents are low.

The importance of screening the coke thoroughly cannot be overestimated, and the bin should be so arranged as to allow for extensive and well-designed screens. Besides the bad influence of coke dust on furnace operation, due to its small size, it is much higher in ash and lower in fixed carbon than the average size coke. Comparative analyses taken of the coke dust and coke at Carrie furnaces show a percentage of 21.5 per cent ash and 74.26 per cent fixed carbon in the coke dust as against 11.83 per cent ash and 83.26 per cent fixed carbon in the average coke.

Much careful experimenting is required to find out just where to stop with the screening process so as not to waste pieces of coke that are all right, and at the same time to remove the dust that would be injurious to the furnace. The slope of the screens, the depth of the stream of coke, the size and arrangement of the holes in the use of plate screens, and the size and distance between bar screens must be determined in each particular case.

Insofar as my experience has been with coke screens, I prefer the cross-bar type, with bars from 5/8-inch to 7/8-inch diameter, and spaced so as to allow an opening of about 3/4-inch to 1 1/2 inches between the bars; these conditions depending upon the size and quality of the individual coke to be screened. The screen should have an angle of about 35 to 45 degrees, and should be located outside of the bin door so as to be readily accessible for cleaning. This type of screen is easily cleaned by running a coke fork along the bars, and this feature is an additional advantage of no mean importance over other types of screens. Plate screens are hard to keep clean, especially when placed inside the bin. The holes clog up more readily than do bar screens, and for this reason must receive considerably more attention in their operation.

The disposal of the coke dust produced (amounting to about 120 tons per day) has been a difficult problem with us, the only use at present time being for covering the iron in the ladles, and as a bottom in the soaking pits at Homestead Steel Works, also under boilers, mixed with coal, this amounting to 60 per cent of the total. However, stokers and grates have been developed which will successfully burn the coke dust, and eventually all the dust produced will be burned under boilers, replacing a large amount of coal, and resulting in considerable economy.

Coke Measured by Volume

We use the volume method of measuring coke at Carrie furnaces, the arrangement of our coke bins being such that weighing coke in the larry car is impossible. When measuring different kinds of coke by the volume method, the weight of coke per skip will vary considerably, unless the bin is of such design as to mix the contents of the several cars in it. This will average the different cokes and probably produce as accurate results as the weighing method, which introduces the error of weighing moisture, a variable ranging from 1 to 10 per cent. The volume method has additional advantages in that it gives a constant volume of coke to the round, which helps to stabilize distribution conditions, and in case small dirty coke is encountered, tends to counteract the result by an increase in weight for the same volume. Also, considerable extra labor is required to handle the coke through the larry cars, and additional expense is sometimes incurred in charging the materials by the necessity of using a separate larry car for the coke when weighed.

Under the present conditions, the operator in the Pittsburgh district has to contend with coke from 14 to 20 different mines and ovens, some of the coke hand drawn and some machine drawn. These conditions produce considerable variation in the weight of coke per unit volume, and militate against the measuring by volume method. One of the most important phases of the charging of raw materials is to properly weigh the several kinds of ore-bearing materials and the flux in the larry cars before dumping into the skips. It is also important to so arrange the several materials that there will be a uniformity in their mixture which will be retained through the successive steps subsequent to their delivery in the furnaces, especially in regard to the prevention of the segregation of lumps.

The arrangement of larry car and bin should be such as to enable the larryman to readily remove any excess amount of material. This is a most important feature, because it is impossible with any present type of bin door to weigh the material accurately and quickly at all times, and if the work of remedying any over-charge is hard to perform, it is certain that it will not be done, except under conditions of constant supervision, which is a practical impossibility. With the large amounts of material required by the modern blast furnace, the operation of weighing the materials must proceed rapidly, and the larry car must be designed to move at high rates of speed so little time may be lost in transporting the charges. At the skip pit the operation of the doors must be simple, reliable and fast, as a further aid in saving valuable time.

Larry-car scales present a large problem in themselves, the condition of operation with which they have to contend is severe, and much attention must be given by the operator to this particular mechanism. Recording scales have been installed on larry cars at many plants, and their adoption has undoubtedly been of great benefit to the operator. These scales are equipped with indicators, which are convenient in showing the larryman how close he is to the required weight of material he is weighing, this being much better than the method of judging the amount in the car by feeling the balance on the ordinary scale.

The arrangement of the materials in the larry car, to secure a good mixture, is an essential feature of good charging methods. However, the proper method is dependent upon the individual designs of larry cars and bin doors, and no arrangement can be given that would be suitable for all conditions, but each operator must determine the best method for his individual case.

At all but one of our furnaces we have four larry buckets per furnace, and each bucket fills the same skip in the charge every round, the charge consisting of two ore, two coke, two ore and two coke. A characteristic charge is shown here as illustrating our method of filling the larry-car buckets.

		Skip A	Skip B
No. 1 buckets	Group No. 3,	5500	5500
	Beaver,	1500	1500
	Briquettes,	1000	1000
	Total,	8000	8000
No. 2 buckets	Group No. 4,	2500	2500
	Group No. 7,	2500	2500
	Limestone,	3000	3000
	Total,	8000	8000

The total burden in this case is 26,000

pounds, with 6000 pounds limestone, and an 11,200-pound coke unit.

It is seen that the two skips will carry the same material in each phase of the ore charge, so that if there is any inequality in the mixture of the materials produced by skip A, it will be rectified by the following skip B. Also the amount of material in all buckets is equal, or as nearly so as practicable—this feature helping to establish uniformity in the distribution conditions at the top of the furnace.

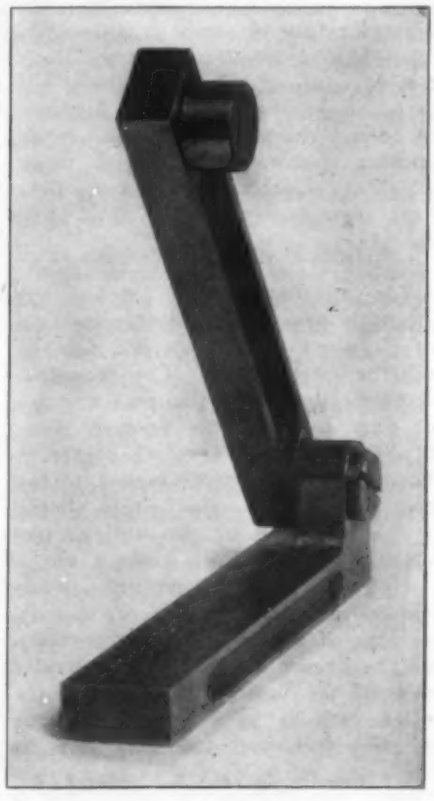
As an additional precaution against the segregation of lumps, especially those of large size, we have placed guards against the skip chutes, which hold the lumps until they have been broken up—this also prevents such lumps reaching the receiving hopper on the furnace top where they might possibly stick the small bell and thus interrupt the process of charging, or in any case might disarrange the distribution of the material by stopping the regular flow from the small bell in that particular sector in which they happen to be located. Also as a matter of safety, since we have introduced the guards the men do not have to go on top of furnace to remove lumps from a small bell, a more or less dangerous proposition on account of the possibility of encountering gas or being caught in a slip.

Skip Cars

Skip cars may contribute considerably to the effort to gain uniformity in the arrangement of the materials in the furnace. In order to further prevent lumps from segregating, and insure good distribution, each individual operator must carefully determine the proper location of skip while dumping, the angle of tilt necessary, and the speed of dumping, which will best suit his conditions. The skip should be designed to prevent ore sticking in it, and should be so constructed that in case, with the volume method of charging coke, it is wished to change the coke unit, the alteration will be simple to make.

One of the most important improvements to the distributing machinery in recent years has been the electrical operation of the bells in conjunction with the skip hoist. Cables run from the bell levers to the hoist house where the electrical mechanism is generally installed, and the bells are operated by means of these cables. The controls of the skips and bells are interlocking, and the bells can be made to operate in a predetermined sequenc with the skips. By this means, a check is had upon the correct sequence of each charge; also the bells open at a fixed rate of speed, which cannot be obtained with steam-cylinder operation. Another good feature of this method is the elimination of the possibility of having the small bell left open when the skip dumps, or prematurely opening the small bell, which would allow the materials to run out of the hopper neck on one side of the bell and thus be distributed very unevenly on the main bell.

Even after attaining uniformity in the distribution of the materials on the large bell, the best results will still not be produced in the furnace until the proper method has been found of arranging the skip loads of coke and ore to produce the most intimate mixture. With the Old-Range ores, good results were obtained by a system of filling which produced thick successive layers of coke and ore, but with the fine



COMPACT SINE BAR FOR MEASURING ANGLES

Mesabi ores now in general use this practice has the effect of forming dense layers of ore through which the gases are no longer able to penetrate and do their work of reduction. With the same idea in mind as that explained by George W. Vreeland in a paper entitled "Handling the Blast Furnace Charge" which was published in June 1, 8 and 15, 1916, issues of THE IRON TRADE REVIEW, we changed from a system as follows:

4 skips Coke on large bell —Dump same into furnace
4 skips Ore and Limestone on large bell, —Dump same into furnace

to this system:

2 skips Ore on large bell
2 skips Coke on large bell
2 skips Ore and Limestone on large bell
2 skips Coke on large bell
} Dump same into furnace

At the time this change was made all our furnaces were comparatively new, ranging from two weeks to two years on the lining. They had been giving us considerable trouble, due to slipping, making off-grade iron, and high coke. Immediate results were obtained by this change in the filling; the furnaces became much more regular, the coke per ton of iron dropped, and slipping became a rare occurrence. This type of filling has been continued ever since on these furnaces, and has proved satisfactory at all times.

Organization and human influence plays a strong part in the results obtained by the operator—the different departments must fit well together so that the work performed by them will be a steady evolution of his ideas; the individual must be taught so that he understands the importance of his task, and realizes the results that will be gained through its proper performance, and incentive must be given the individuals to so perform this work at all times in such a manner that will be conducive to the general good of the men, the plant, and the management.

Sine Bar for Accurate Measurements

While engaged in precision jig, fixture and gage work, the toolmaker is often confronted with the problem of measuring angles with absolute accuracy. Generally an improvised sine bar is utilized for this purpose. To facilitate the rapid and accurate measurement of angles, the Simplex Tool Co., Woonsocket, R. I., recently developed the device shown in the accompanying illustration.

The tool consists of a base to which the sine bar is swiveled through the medium of a positive locking joint. All parts are hardened to protect them from undue wear and are finished by grinding to insure accuracy.

The tool is so constructed that it can be set against an angle plate or laid down flat. Some classes of small work can be clamped directly to the bar owing to the channel construction employed. It is said that the clamping device locks the two parts together by means of a centralized grip that will not shift after the tool is set.

The tool is used in conjunction with a table of sines which enables the operator to measure the angle desired within a few seconds variation by finding the sine of the angle to be measured, multiplying by five and adding the constant which is plainly stamped on the tool. Then the arm carrying the button is swung down until the measurement is obtained either with micrometers measuring over the base, or by gage blocks.

Heating Soaking Pits Electrically

To Obtain a Uniform Temperature, the Heating Should be Done by Means of the Walls of the Pit Rather Than by Direct Radiation From the Resistor Element

BY THADDEUS F. BAILY

THE introduction of electrically-heated furnaces to the heating operations subsequent to melting and refining in the steel industry has experienced the slow development incident to the introduction of all radical innovations in any industry. Many of the types that will find wide application in the future, while entirely feasible, have, when offered, been met with the statement that if such an equipment was a good thing, why were they not in general use. Other types, that have been in regular service for a considerable number of years, whose construction and operation are much more elaborate and whose commercial advantages are no greater, are now generally accepted as the most rugged and reliable equipment for the purpose. This latter refers to electric furnaces for the annealing and heat treatment of steel.

There has been a reluctance of manufacturers generally to consider that there is a difference in cost per ton of material put through a furnace and the cost per ton of material heat treated and coming within the specifications. There has been no greater factor in changing this attitude than the conditions brought about during the war, where in a great many plants there was a wide difference between the quantity of material inspected and the quantity of material accepted.

Three conspicuous examples of the electric furnace for heat treating are those for Liberty motor crank shafts, over half of which were so heat treated; cast-steel anchor chain, all of which was heat treated in furnaces of this character; and draw-bar knuckles, substantially half of those which are used in America being thus heat treated.

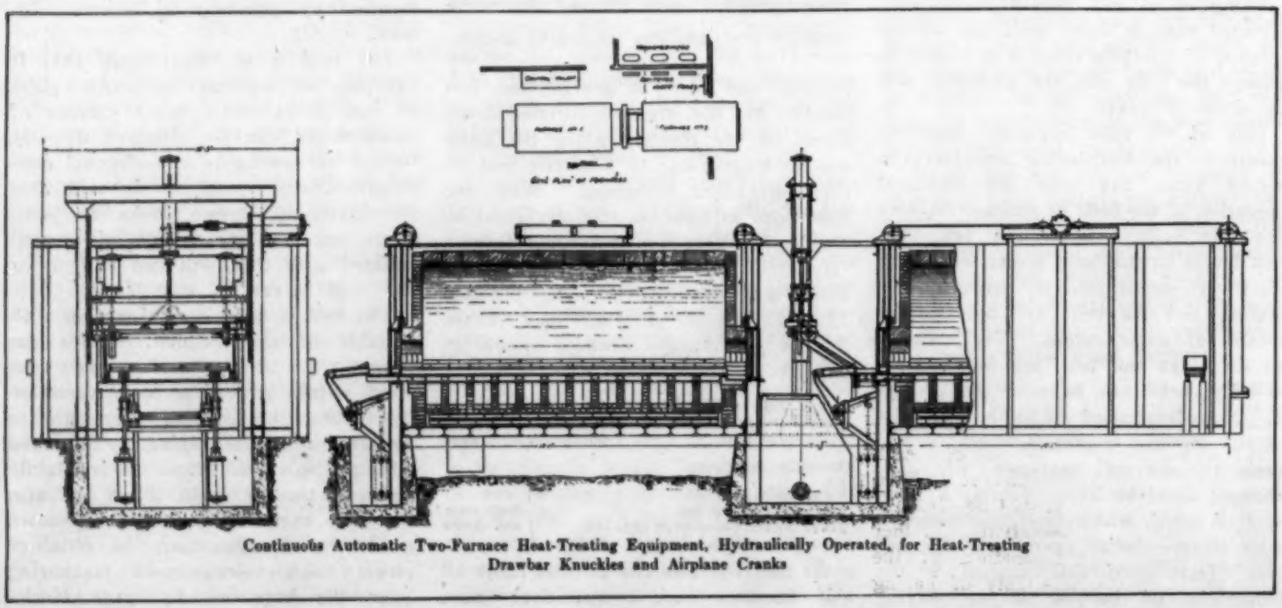
Heating Ingots Electrically

The electric soaking pit for hot ingots is perhaps the most promising development of the electric furnace to the steelmaker. The principal recommendation of the present type of pits, either of the fired or non-fired type, is the low-fuel consumption per ton of metal soaked. This cost in a well handled pit is almost a negligible item, amounting frequently to only a few cents a ton.

However, in the larger mills, when running at full capacity, features such as lack of uniformity in temperature of the heated ingot, excessive oxidation of the ingot, and the like, are often such as to outweigh the item of mere fuel cost; and while it is to be admitted that electric pits cannot compete with fuel-fired pits under ordinary circumstances, when heating cold ingots, the time is not far distant when substantially all modern mills rolling hot ingots will use electric pits for this part of steel-mill operation.

From electric furnaces operating at the same temperature, or at even higher temperatures than that required in soaking pits, and which have been operating over long periods of time, it is apparent that the stand-by, or wall losses, of a typical pit adapted to hold 16 three-ton ingots will not exceed, as a maximum, 1000 kilowatts, and will be expected to operate on considerably less current. However, taking 1000 kilowatts as a basis when operating on hot ingots, whose superheated interiors are sufficient to bring to temperature their colder outer shells; and operating on a soaking time of one and one-half hours, the capacity per pit will be 32 tons per hour with a figure of 1000 kilowatts per hour for the furnace, the current consumption per ton of metal soaked would be 35 kilowatt hours per ton; and taking as a basis of cost of electricity in the steel mill of one-half cent per kilowatt, the cost per ton of metal soaked would be $0.175, to which might be added a cost of $0.05 per ton for renewals

Abstract of a paper presented at the annual meeting of the American Iron and Steel Institute, May 23, 1919. The author, Thaddeus F. Baily, is president of the Electric Furnace Co., Alliance, O.



Continuous Automatic Two-Furnace Heat-Treating Equipment, Hydraulically Operated, for Heat-Treating Drawbar Knuckles and Airplane Cranks

and repairs, making a total cost of $0.225 per ton.

It is to be expected that this cost for heat may be in excess of similar costs for gas-fired pits or unheated pits; but when taking into consideration that the electric pit will eliminate the roll breakages due to cold ingots; delays in the mill due to ingots unevenly heated; oxidation, thus producing a cleaner bloom and an actual saving in metal due to this elimination of oxidation, amounting to perhaps one-half of 1 per cent; as well as the ability of the electric pit to save labor; it is certain that the higher cost will be more than offset by the advantages, and that per ton of metal rolled in a given period, the actual cost by the use of an electric pit will be less than by other means.

How Electric Pits Are Built

The resistance elements themselves, composed, as in all furnaces of this class, of broken carbon thrown loosely into a carborundum, fire-sand trough supported on brick pillars, are located along the outer wall of each side of the pit, and protected against the liability of serious accident from the ingot by being recessed some distance back from the ingot cell. The heat from this resistance element is radiated to the circular wall of the pit, and thence to the cover, the partition wall of the pit, and to the ingots. The cross section of this resistor element is such that there is little difference between its temperature and the ruling temperature of the pit; and in actual practice most of the heating is done by the walls of the pit, rather than by direct radiation from the resistor element—this being of the highest importance in obtaining uniformity of heating.

In cases where the ingots cannot be delivered to the pit with enough heat for them to reach a high enough temperature without the addition of more heat from the pit, a longer time will be required by the ingots to bring them to temperature, and at the same time the capacity of the pit in tons per hour will be reduced. But taking as a basis, ingots whose average temperature would be 1800 degrees Fahr., requiring 300 degrees additional for bringing them to temperature, the capacity of the pit would be reduced to 24 tons per hour, the electrical capacity of the pit increased to 1500 kilowatts, and the current consumption increased to 60 kilowatt hours per ton.

While with ingots charged at an average temperature of 1500 degrees Fahr., the capacity of the pit would be reduced to 16 tons per hour, and the current consumption increased to 90 kilowatt hours, without increasing the electrical capacity beyond 1500 kilowatts. Thus we have for a total of heating costs, including the renewals and repairs, and with power taken at $0.005 per kilowatt

Hot ingots	$0.225
Ingots at 1800 degrees Fahr.	0.350
Ingots at 1500 degrees Fahr.	0.500

the final temperature in each case being taken as 2100 degrees Fahr.

It is believed that the continuous type reheating furnace will find wide application in the heating of cold steel for forging and rolling in relatively small capacities, and in reheating steel of high quality; but where large tonnages of cold blooms or billets are to be heated, a combination fuel and electric furnace—to be later described—will be better adaptable for such work.

An electric heating furnace was built recently for heating 3¼-inch round billets for shell forgings, and while the current cost of supplying this particular furnace was high, and the operating conditions not particularly favorable, nevertheless the reduction of rejections of forgings due to eccentricity, the saving of the dies due to the elimination of scale, other advantages, such as better working conditions and simplicity of control, enabled the results to compare favorably with coal-fired practice.

This furnace was of 600-kilowatt capacity, and in actual practice handled 1½ tons of steel per hour, with a current consumption of a little over 450 kilowatt hours per ton, or a thermal efficiency of a little more than 50 per cent. Under more favorable conditions, an efficiency of 66 per cent, or a current consumption of approximately 300 kilowatt hours per ton has been obtained. So that with low cost of current, which it is believed may be taken as $0.005 per kilowatt in steel mill power costs, the fuel cost for cold heating in units of this size would be $1.50 per ton.

Electric Reheating Unit Saves Metal

An application that it is believed will find favor in certain steel-mill operations is the use of an electric furnace for reheating billets for finishing mills, wherein the blooms or billets coming from one mill are too cold to put into the finishing mill and will require approximately 200 degrees additional heat.

The calculations on such an equipment are as follows, for a capacity of 15 tons of 4-inch square billets per hour, charged into furnace at 1800 degrees Fahr. and brought to 2000 degrees Fahr. Such a furnace would require 800 kilowatts per hour for its operation, and somewhat under 60 kilowatt hours per ton of metal reheated, and with $0.005 for power, this would make a cost of $0.30 per ton of metal thus reheated. As an electric furnace of this character would undoubtedly save one-fourth of 1 per cent of metal over fuel-fired furnaces, which would amount on steel worth $40 per ton to a saving of $0.10 per ton, and then taking into consideration the low efficiency to be expected of a fuel-fired furnace of this character operating on hot billets only, there would be a decided advantage in the use of the electric furnace for such an operation.

Final Heat Electrical

Where large tonnages of cold blooms and billets are to be heated, however, unless electricity can be obtained at an exceptionally low rate, and fuel can only be had at a high cost, a combination gas and electric furnace wherein the earlier stages of the heating up to say 1800 degrees Fahr. is handled by fuel, and the final temperature handled electrically, is perhaps the only type that can compete with the continuous fuel-fired billet heating furnace.

Such a combination would enable the preliminary heating to be done with fuel, without danger of excessive oxidation that is present in the fuel-fired billet heating furnace, and will insure a uniformity in the heating of the billets that is not generally obtainable in fuel-fired furnaces of this type; and while there would be a small saving of perhaps 50 pounds of coal per ton of metal heated, due to lower temperature to which the billets are heated by the fuel-fired end, against this must be charged, say, 60 kilowatt hours per ton of metal, or $0.30 per ton of metal heated for the final stage by electricity; nevertheless, the advantage of uniformity in temperature, elimination of scale, etc., and more accurate control, will justify in many cases the use of such a combination furnace.

Of the annealing furnaces in the steel industry, the recuperative car type will have perhaps the widest application. One notable feature of these furnaces is that the annealing will be done without the usual covers required in fuel-fired furnaces ordinarily used for this work, which will constitute one of the greatest savings in annealing, as compared with present methods. This recuperative type furnace lends itself to the highest economy, as after the steel has

reached the full temperature and is passing toward the discharge end of the furnace, a large part of this heat is given up to the cold incoming material.

The equipment referred to is of 600 kilowatts electrical capacity, and is approximately 225 feet long and 22 feet wide. The material is handled on sand-sealed cars, 13 feet long and 4 feet wide, and adapted to hold 20 tons of material, there being in all 17 cars located on each of the two lines of track passing through the furnace, each line of cars passing in opposite directions. In the middle of the furnace is located the heating chamber proper, which is 26 feet long, holding two cars in the heating on each track at a time, or substantially 80 tons of material at a time in the heating chamber.

A movement of the cars takes place on each track approximately every six hours, discharging at that time two 20-ton cars of material, one at each end of the furnace, and similarly charging at each end of the furnace a car of cold material. The cars are moved forward by means of a hydraulic machine, operated by a 600-pound water pressure system. One of the requirements of this equipment is that when annealing low-carbon, cold-rolled strip steel the hardness should not exceed 20 scleroscope measurement. All of the tests, when made, gave results between 18 and 19.

Taking again large steel-mill practice of current at one-half cent per kilowatt, the cost of annealing in this type of furnace would not exceed $0.60 per ton, which will compare favorably with coal-fired annealing furnaces from a fuel standpoint, and in addition will completely eliminate the expense of covers, as well as a considerable amount of labor and will introduce a precision in annealing which it is not possible to obtain with present equipment.

In heat-treating equipments, which consist of two furnaces, one for the hardening temperature and one for the drawing temperature, in connection with a quenching mechanism located between, electric furnaces have been first recognized as standard equipment for exacting work in the steel industry, and the earlier of these furnaces, especially of the automatic type, have been in use now for several years. Two heat-treating furnaces were used last year for the heat treating of crank shafts for the 12-cylinder Liberty airplane motors. On account of the irregular shape of the material under treatment, and also to enable other sizes and types of airplane shafts to be handled interchangeably, a special type of cast-steel chair was developed, so that the direct force of the pusher is brought against a line of these chairs, the material to be heated thus lying independent and free from strain while going through the furnace.

Many of the arguments used against the introduction of electric furnaces were used against the introduction of large motors in the steel mills, and against electric haulage, and the statements frequently made through all the years about any innovation that "it has not been done and it cannot be done" must gradually yield, as one by one the various types of electric furnaces from heat-treating equipments to soaking pits go into regular, commercial and economical service.

Furnace Radiation Lowered by Painting

BY PROF. J. W. RICHARDS

A WRITTEN discussion of Mr. Baily's paper, "Heating Soaking Pits Electrically," which appears on the foregoing pages, was presented by J. W. Richards, professor of metallurgy, Lehigh university. The discussion is in part as follows:

"Mr. Baily's paper has two outstanding characteristics: First, the careful record of successful practice already initiated, and second, the modesty with which he forecasts the extension of these methods in the steel industry. The cost of electric heating was wisely compared by Mr. Baily with that of fuel heating under conditions most favorable to the latter. He has also assumed almost a minimum cost of fuel, and therefore the least favorable conditions for its replacement by electric heating. On the other hand he has assumed the cost of electric power at 0.5c per kilowatt-hour, at which price it can be generated in almost any steel works district and has left to be inferred the greater economy of electric heating where electric power may be obtained at lower figures, such as 0.4c per kilowatt-hour in the neighborhood of Niagara Falls, and 0.3c per kilowatt-hour near still cheaper water powers.

"We must not overlook the fact that steel mills have been built where fuel is cheap, which is, generally speaking, where cheap hydroelectric power is not available. We should consider the possibilities of using Mr. Baily's electric heating furnaces at points where fuel is dearer and electric power cheaper than the figures quoted, in other words, the possibility of extending the methods to regions considerably removed from cheap coal. As an extreme example, the Girod steel works at Ugines, France, is far removed from cheap coal, but is operated entirely by very cheap electric power. It should use none other but these electrically heated furnaces. Between this and the ordinary practice at steel producing centers are many works which will find it immediately profitable to install the electric heating furnaces.

"A second point I wish to make is, that Mr. Baily makes a very liberal allowance for stand-by, or wall losses in his furnaces. He assumes 1000 kilowatts as necessary to simply hold the temperature in a 16-ingot, 36-ton soaking pit. It is entirely proper for him to make this liberal allowance, but I am confident that a scientific study of the construction of the walls of the soaking pit, and particularly of the radiating surface of the outside of these walls will reduce this figure very considerably—perhaps event cut it in half.

"Iron and steel men do not pay sufficient attention to reduction of radiation losses from furnaces and very hot apparatus. They paint surfaces black, the best color to radiate heat, when they should be painted white. They smile sarcastically when it is suggested to them that heat losses can be diminished largely by proper attention to the radiating surface. Tell a foundryman that heat could be saved in sufficient quantity to pay well if the outsides of his furnace were nickel plated and kept bright, and he would probably regard his informer as demented. Yet, in many cases the statement is true and doubly true of electric furnaces. I strongly urge the use of white aluminum paint as one step in reducing radiation losses on furnaces. Some of our laboratory furnaces are encased in polished monel metal and undoubtedly it would be well to encase steel works electric furnaces in this manner. Even bright nickel plating of ordinary iron shells would in most cases pay for itself in heat saved in a short time.

"Mr. Baily's whole article is a demonstration of the possibility of extending the precision, accuracy and economy of laboratory methods into the steel mill. An extension of this work will mean almost the remaking of our steel industries."

High-Speed Tool-Steel Efficiencies

Determined by Extensive Lathe Operations and Chemical Analyses—Effects of Various Methods of Annealing Shown—Micrographic Study Discloses the Difference Between Annealed and Quenched Specimens

BY PROF. JOHN O. ARNOLD and FRED IBBOTSON

THE exact determination of the complex chemical constitutions of high-speed steels seemed 10 years ago to be shut up in a scientific citadel which might well defy all attacks made upon it by the metallurgical chemist. It was, however, certain that any such assault must be preceded by a series of patient sapping operations carried out to ascertain the forms of existence of the elements of high-speed steel when present singly in quantities ranging from about 2.5 to 25 per cent in iron containing about 0.7 per cent of carbon. Consequently about 1909 one of the authors and Professor A. A. Read, of the University of Wales, commenced a series of experiments

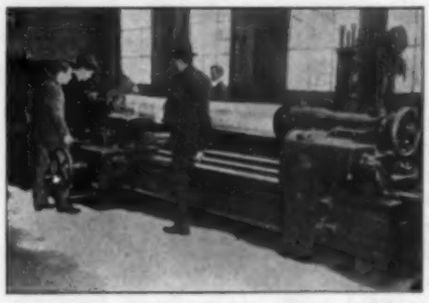


FIG. 2 — THE 40-HORSEPOWER ELECTRICAL SPEED-INCREMENT LATHE USED FOR TESTING STEELS AT SHEFFIELD UNIVERSITY

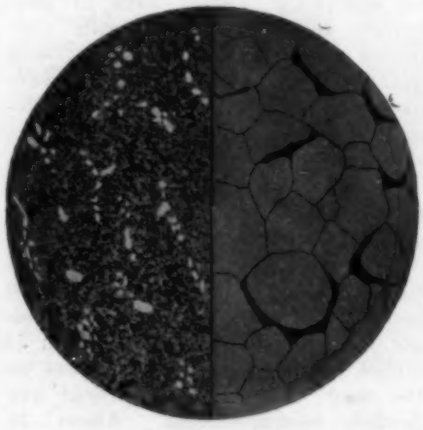


FIG. 1—STEEL NO. 1574. LEFT HALF-SECTION ANNEALED, RIGHT HALF-SECTION QUENCHED IN WATER

to ascertain the composition of the carbides of chromium, vanadium, tungsten and molybdenum, existing in plain carbon steel containing in addition only a single alloying element.

For the present research a set of 36-pound ingots, representative of six types of high-speed steel, were melted in white crucibles with coke fuel. The alloys were cast into 2-inch square ingots which were hammered down into bars 1⅛ inches by ⅝-inch and "file" annealed by heating the bars during a period of about eight hours until a temperature of nearly 800 degrees Cent. was attained. They were kept at this temperature for about an hour and cooled down during a further period of about 24 hours. The annealed bars were subsequently forged into turning tools and machined into standard carbide test-bars. The analyses of the drillings, taken with the usual precautions from the six annealed bars, are embodied in Table I. An inspection of this table will show that throughout silicon contents of 0.4 per cent were sought, the manganese was calculated for 0.2 per cent, the phosphorus for 0.015 per cent and the sulphur at the lowest possible content of 0.06 per cent. With reference to carbon, 0.65 per cent was sought with an unavoidable plus or minus difference of 0.1 per cent. With reference to the real alloying elements of high-speed steel, it was desired to keep the chromium constant throughout the series between 2.7 and 3 per cent. Two tungsten contents were sought, namely, a low limit of 12 per cent and a medium limit of 16 per cent. To one medium tungsten steel no vanadium was added; to the other and as well in all the steels in which vanadium was present, the mixes were calculated to melt out with 1.25 per cent vanadium. To one of the 12 per cent tungsten steels no vanadium and 2 per cent molybdenum was added. In the second 12 per cent tungsten steel, the aim was to introduce 2 per cent molybdenum and 1.25 per cent vanadium. In one steel tungsten and vanadium were designed to be absent, being replaced by 6 per cent of molybdenum. In the final ingot the 6 per cent of molybdenum was supplemented by the designed addition of 1.25 per cent vanadium.

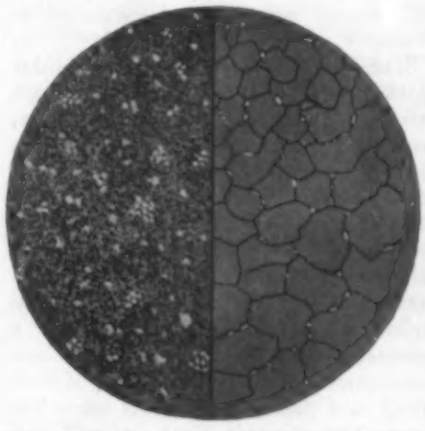


FIG. 3—STEEL NO. 1576. LEFT HALF-SECTION ANNEALED, RIGHT HALF-SECTION QUENCHED IN WATER

The method used and the apparatus employed for the electrolytic separation of the carbides were substantially those which have been used for tungsten carbide, using a hydrochloric acid electrolytic of specific gravity 1.02 with a current density of 0.18 amperes per square inch of anode throughout. The time of immersion in the

Table I

Analyses of Six Steel Specimens

Crucible Cast Steel No.	C.	Cr.	W.	Mo.	V.	Si.	S.	P.	Mn.
1574	0.75	2.79	absent	5.79	1.29	0.47	0.061	0.016	0.18
1575	0.72	2.79	absent	5.72	absent	0.41	0.061	0.015	0.18
1576	0.76	2.82	12.12	2.06	1.28	0.60	0.059	0.015	0.19
1577	0.62	2.79	12.00	2.06	absent	0.43	0.060	0.016	0.20
1578	0.55	2.62	15.93	absent	1.16	0.34	0.058	0.017	0.20
1579	0.60	2.78	15.54	absent	absent	0.44	0.058	0.016	0.21

Abstract of a paper presented at the annual meeting of the British Iron and Steel Institute, May 8 and 9, 1919. The authors, John O. Arnold and Fred Ibbotson, are respectively dean and professor of metallurgy and senior lecturer in metallurgical chemistry of the University of Sheffield, Sheffield, England.

electrolyte was 15 hours instead of about 1½ hours. The results are set forth in Table III. The approximate percentages of the totals of the vital elements present

Table II

Percentages of Elements Present

Steel No.	C.	Cr.	W.	Mo.	V.
1574	93.69	53.50	absent	85.29	75.86
	94.97	54.86	absent	87.54	76.72
1575	91.54	62.20	absent	94.21	absent
	92.83	60.92	absent	93.37	absent
1576	97.88	55.51	92.68	91.45	87.12
	97.50	55.82	92.49	92.23	85.53
1577	95.81	56.74	84.67	89.86	absent
	97.38	57.14	85.04	91.16	absent
1578	96.68	27.40	92.45	absent	92.53
	95.79	27.27	92.53	absent	94.64
1579	98.86	59.34	91.22	absent	absent
	99.88	59.29	91.33	absent	absent

and found in the carbide and tungstide residue are embodied in Table II, and are calculated from Tables I and III. In Table IV are embodied, as the result of calculations made from Table II, the mean analyses of the carbides on a 100 per cent basis. From Table IV have been obtained, by the usual calculations, the atomic relationships embodied in Table V.

The correlation of the micrographic with the chemical analyses, though broadly clear, is somewhat general and leaves the exact nature of the constituents revealed considerably in surmise. It was found that four half-sections would sufficiently well represent the types of structure presented by all the 12 microsections examined. Six of these were taken from the well-annealed bars and a corresponding six were cut into microsections ⅝-inch square by ¼-inch thick and these were rapidly quenched from 1300 degrees Cent. in cold water. The annealed specimen of steel No. 1574, the left half-section shown in Fig. 1, shows a pale background of an intermetallic solution overlaid by dark troostitic and paler sorbitic varieties of a pearlite of unknown composition, the whole being overlaid by nodules and streaks of a brilliant white cementite, no doubt a mixture of segregated carbide. The quenched specimen, the right half-section of Fig. 1, shows well-marked allotrimorphic crystals of a mixed hardenite, which, here and there, are partially surrounded by a unique dark etching pearlitic constituent. In all probability this is troostitic vanadium pearlite, which does not transform to its hardenite until heated to 1400 degrees Cent. The annealed specimen of steel No. 1576, shown as the left half-section in Fig. 3, is very similar to the annealed specimen of steel No. 1574. The quenched specimen of this same steel, shown as the right half-section in Fig. 3, exhibits allotrimorphic crystals of hardenite surrounded with thin walls of troostitic pearlite together with fairly thick and very broken cell walls of cementite more or less segregated into nodules. In none of the specimens was any sulphide detected, although in each section about 0.06 per cent of sulphur was present. Doubtless this sulphur is in solid solution, either as sulphide of tungsten or sulphide of molybdenum. It has already been pointed out by one of the authors that high tungsten steels will take into solid solution the sulphide of tungsten produced by the presence of over 0.2 per cent of sulphur in high-speed steels such as were being tested.

Table IV

Analyses of Carbides

Steel No.	C.	Fe.	Cr.	W.	Mo.	V.
1574	5.15	40.54	10.92	.....	36.24	7.13
1575	4.30	49.82	11.12	.....	34.73	.....
1576	3.15	30.06	6.63	47.49	8.01	4.67
1577	2.78	33.31	7.45	47.73	8.74	.....
1578	2.36	24.17	3.18	65.46	.....	4.82
1579	2.53	30.16	7.01	60.29	.....	.....
Atomic weights	12	56	52	184	96	51

Table III

Analyses of the Carbides and Tungstide Residues

Steel No.	Weight (grammes) of steel dissolved	Weight (grammes) of residue obtained	Percentage Compositions: Carbon	Iron	Chromium	Tungsten	Molybdenum	Vanadium	Totals	Mean impurities by difference[1]
1574	11.1350	1.5589	5.04	39.66	10.64	absent	35.28	6.99	97.61	2.45
	11.1550	1.5949	5.00	39.44	10.68	absent	35.44	6.92	97.48	
1575	8.3378	1.3383	4.11	48.04	10.81	absent	33.57	absent	96.53	3.55
	8.3158	1.3282	4.19	48.09	10.64	absent	33.44	absent	96.36	
1576	8.8624	2.1575	3.06	29.08	6.42	46.14	7.74	4.58	97.02	2.89
	8.8800	2.1602	3.05	29.30	6.46	46.08	7.81	4.50	97.20	
1577	9.3176	2.0490	2.68	32.42	7.20	46.21	8.42	absent	96.93	3.04
	9.3484	2.0582	2.72	32.16	7.24	46.34	8.53	absent	96.99	
1578	8.7718	2.0124	2.33	23.96	3.13	64.24	absent	4.68	98.34	1.58
	8.9466	2.0426	2.32	23.62	3.13	64.62	absent	4.81	98.50	
1579	9.5638	2.5068	2.46	29.32	6.84	58.78	absent	absent	97.40	2.55
	9.5934	2.3182	2.48	29.48	6.82	58.71	absent	absent	97.49	

[1]Consisting mainly of hydrated SiO_2 (+ roughly 0.2 per cent manganese existing as Mn_3C).

Table V

Atomic Relationships

Steel No.	C.	Fe.	Cr.	W.	Mo.	V.
1574	0.429	0.724	0.209	.....	0.378	0.140
1575	0.358	0.890	0.213	.....	0.362	.....
1576	0.262	0.537	0.127	0.258	0.083	0.092
1577	0.232	0.595	0.143	0.259	0.091	.....
1578	0.197	0.432	0.061	0.356	.....	0.095
1579	0.211	0.539	0.134	0.328	.....	.....

The tools were forged at a mellow yellow heat, about 1100 degrees Cent., roughly ground, hardened and finally ground into the finished shape. Two methods of hardening were adopted, the first, the method used by toolsmiths in ordinary works practice. The noses of the tools were gradually heated in a coke hearth to a yellowish-white color and were then quenched out in whale oil or were quenched to a black in warm water and cooled off in a strong compressed air-blast. By the second method, the noses of the tools were slowly preheated in a smith's fire to a bright red color and were then raised to a yellowish-white heat in an electrically melted bath of pure barium chloride, pyrometrically controlled at 1300 degrees Cent., and quenched out in whale oil, or were quenched in water at about 60 degrees and quickly cooled in a compressed air-blast.

It was decided to obtain a hard steel shaft of the most even micrographic texture possible. An acid open-hearth ingot about 17½ inches square and weighing about 2700 pounds was therefore cast. This ingot was hammered down to about 13 inches round and allowed to cool on the floor of the forge without any further heat-treatment. About 25 per cent of the upper end of the open-topped ingot was discarded and the shaft, weighing about a ton, was turned down to a little under 12 inches diameter before commencing the tests in order to remove the decarburized skin and surface hammer hardness. By virtue of its composition this bar naturally presented a very even texture of finely granular manganiferous pearlite. During turning operations, turnings were taken from each end and midway from the bar and analyzed but the results showed that segregation was negligible. A series of hardness figures by the Brinell machine and by the scleroscope were taken from transverse sections of the bar and it was found that the Brinell values varied from 241 to 269 and the scleroscope figures from 30 to 37. These records from a ton shaft are not all satis-

factory with reference to mean hardness.

The whole of the tests were conducted without any lubrication on the 40-horsepower electrically driven speed-increment lathe used for testing high-speed steel in the faculty of metallurgy of Sheffield university. This lathe is illustrated in Fig. 2. The starting speed was increased 1 foot per minute until the tool broke down. When the cutting speed reached well over 30 feet per minute the cutting edge of the tool became red hot, over 600 degrees Cent., and the small particles of steel occasionally ejected from the test-bar scintillated brightly for a second or so. The results of the efficiency tests on the steels, together with their dominating alloying elements and other details are embodied in Table VI. The comparative efficiencies of the six types of high-speed steels tested in this research are shown in Table VII in order of merit as measured by the weight of hard unannealed steel removed during the tests. A perusal of this table will render evident the fact that the efficiencies of the three steels containing vanadium (and consequently capable of being water-hardened without cracking) have a mean efficiency of only 61.9 obtained from the nonvanadiferous oil-quenched steels. The mean efficiency of the steels hardened from the temperature-controlled University salt bath equals 108.9; that of the steels hardened from the smith's fire equals 102.5.

With reference to the relative hardening power of tungsten and molybdenum, the author in another paper showed that the theoretical hardening powers of molybdenum and tungsten in high-speed steel were respectively about 2.3 to 1. In the present research, however, it has been found that when 1.25 per cent vanadium is present, this hardness factor becomes greater, being about 2.7 instead of 2.3. Thus assuming that steels No. 1574 and No. 1578 are practically equal in cutting efficiency, then 5.79 per cent molybdenum is equivalent to 15.93 per cent tungsten, but 15.93 divided by 5.97 equals almost 2.68. On this basis, taking steel No. 1577, the theoretical tungsten equivalent would be 12 + (2.06 x 2.68), which equals 17.5 per cent tungsten, but the actual mean lathe efficiency of this steel as compared with that of steel No. 1574 is only 12.5 to 18.6 pounds of steel removed, hence theoretical hardness and practical lathe efficiency are by no means identical terms, as has been decisively demonstrated by one of the authors. An interesting comparison is found in the mean relative efficiencies of steels No. 1574 and No. 1575, which are respectively 18.6 and 9.4, and owing to the well-known erratic behavior of molybdenum steel No. 1575 is the only steel of the whole series which broke in the lathe. Hence about 1.2 per cent vanadium has prevented water-cracking and raised the cutting efficiency of the steel 98 per cent.

Table VII
Steel Efficiencies

Steel No.	Efficiency position	Type	No. of tests	Pounds of steel removed
1574	1	V-Mo	six	111.90
1578	2	V-W	six	109.80
1576	3	V-W-Mo	six	96.10
1577	4	W-Mo	six	72.00
1579	5	W	six	66.60
1575	6	Mo	five	47.00

Norwegian Grinding Wheels

A Norwegian company in Arendal is supplying grinding wheels produced in electric furnaces. The company's wheels, suitable for castings and coarse work, are made of fused carbide of silicon, which produces gray-green crystals of great hardness. The company's wheels for grinding steel are made of aluminum oxide known as artificial corundum, obtained by fusing bauxite into red-brown crystals, which are also hard and tough.

The crystals are ground and sorted mechanically, ranging from No. 10, which is the coarsest, to No. 250, which is the finest. To produce grinding wheels, the powders are generally mixed with some binding medium such as clay having a melting point of 2200 to 2500 degrees Fahr. The disks are first formed in hydraulic presses, then exposed to the above temperature in an electric furnace, where the clay fuses and the whole becomes a hard, homogeneous mass. The hardness is proportionate to the quantity of clay used.

Shellac or water glass is also used as binding materials in which case the temperature varies from 350 to 550 degrees Fahr.

All wheels are provided with lead bosses and turned in the lathe after completion so as to be accurately centered. The elastic shellac wheels are turned with diamond tools, the others by rotating conical steel cutters. —*Teknisk Ukeblad.*

Table VI
Results of 35 Lathe-Tool Tests on Unannealed Hard Steel Bar

Cut 3-16 Inch. Traverse 1-12 Inch. Starting Speed 20 Feet per Minute. Speed Increment 1 Foot per Minute

Tools from Ingot No.	Approximate percentages of dominating alloying elements: C.	Cr (constant)	W.	Mo.	V.	Durations of tests in minutes and seconds: 1st grinding.	2nd grinding.	3rd grinding.	Mean	Breakdown speeds in feet per minute: 1st Grinding.	2nd Grinding.	3rd Grinding.	Mean	Actual weights of steel removed from test bar in pounds: 1st Grinding.	2nd Grinding.	3rd Grinding.	Mean	Method of quenching. (In hardening from the salt bath the temperature was about 1300° C. ± 10° C.[3])
1574	0.75	2.79	absent	5.79	1.29	14–26	14–42	15–21	14–50	34.2	34.2	34.8	34.4[2]	18.6	19.0	21.7	19.8	From University salt bath —hot water and air.
1575	0.72	2.79	absent	5.72	absent	13–18	14–6	12–14	13–13	32.8	33.9	32.3	33.0[2]	17.8	19.1	15.7	17.5	By steelworks tool smith.
						7–37	7–8	Tool broke	7–23	26.8	27.3	Tool broke	27.0	8.9	8.6	Tool broke	8.8	From University salt bath —cool whale oil.
1576	0.76	2.82	12.12	2.06	1.28	7–37	9–11	8–41	8–30	27.0	28.8	28.0	27.9	8.8	10.9	10.4	10.0	By steelworks tool smith.
						14–58	14–6	12–59	14–1	34.0	34.0	32.0	33.3[2]	20.1	18.6	17.0	18.6	From University salt bath —hot water and air.
1577	0.62	2.79	12.00	2.06	absent	11–40	12–7	9–8	10–58	31.0	32.0	29.2	30.7	14.1	15.0	11.0	13.4	By steelworks tool smith.
						12–3	10–21	9–36	10–40	31.8	30.0	28.8	30.2	15.0	12.9	11.4	13.1	From University salt bath —cool whale oil.
1578	0.55	2.62	15.93	absent	1.16	11–13	10–30	7–20	9–41	31.2	29.9	27.3	29.5	13.9	13.1	8.6	11.9	By steelworks tool smith.
						15–2	13–33	11–28	13–21	35.0	33.2	31.0	33.1[2]	20.2	17.9	14.9	17.7	From University salt bath —hot water and air.
1579[1]	0.60	2.78	15.54	absent	absent	16–1	14–19	11–20	13–53	35.8	34.0	31.2	33.7[2]	22.6	19.8	14.4	18.9	By steelworks tool smith.
						9–58	8–52	7–27	8–46	28.8	28.2	27.2	28.1	12.6	10.8	8.5	10.6	From University salt bath —cool whale oil.
						11–6	8–37	8–42	9–28	31.2	28.2	28.0	29.1	13.7	10.6	10.5	11.6	By steelworks tool smith.

[1] Up to about 1906-7 this was the type of the best high-speed steel on the market. About this date it was surpassed by steel of the type exemplified in No. 1578.
[2] Cutting edge of tool red hot.
[3] Pyrometers employed.

Engineers Accomplish Much in War

Records of Technical Experts' Achievements in France Now Being Prepared by Government—Many Members of Service Lost in Actual Fighting—Hundreds of Miles of Roads, Scores of Plants Built

IN applying knowledge gained through scientific achievements of recent years, and in drawing on a vast amount of technical skill, engineers of the United States army accomplished in France a work which in magnitude exceeds any similar undertaking in American history, according to a record now being prepared by the government. The work of the engineers at the front, where machine guns, shells and gas brought death and pain to many members of the technical branch of the service, is chronicled, as well as their experiences and accomplishments behind the lines.

From Cantigny to Chateau Thierry engineer troops fought as well as worked, taking a particularly important part in the drive at St. Mihiel and through the Argonne. They advanced with the tanks and made possible the progress of those lumbering monsters through many difficult places; they threw footbridges across streams which barred progress of the infantry; they built rough roads for the artillery which followed, and then better roads for the great supply trains.

Many Problems Solved

Behind these combatant engineers came the great organization of construction and supply administration. Problems of military engineering, technical supplies, forestry and other industrial development, and the construction of railways, harbors and warehouses occupied the minds of some of the best trained men in the profession.

During the time we were in the war 3,225,121 tons of engineering supplies were distributed. Twenty-three locomotive cranes were in the service of engineer supply in France, the accompanying table giving the principal supplies handled.

Much important work was done in standardizing all classes of material so that quantity-production methods could be used. Shops were operated at many points in France, and in other shops American engineers were placed in French organizations to infuse American enterprise.

Three large cement mills were taken over from the French and worked on a 24-hour schedule to supply our army's needs.

Transportation of vast amounts of material required at the front made it necessary to construct railways and yards on a scale previously unknown in France. At the St. Sulpice terminal 147 miles of standard track were built. At Nevers a double-track railway bridge 2190 feet long was built over the Loire river. In all 937 miles of standard single track were laid, fulfilling in equivalent, the prediction that to supply our armies in France a double-track railroad would have to be built from the ports to the front. A total of 535 acres of covered storage was built or acquired, of which 482 acres represented new construction.

At Gievres the largest refrigerating plant in the world was built. It had a capacity of 5200 tons of meat, and produced 250 tons of ice per day. Another plant almost as large was built at Bassens.

The difficulties of water supply were great and immense treating plants were necessary. Scarcity of lumber also required operations on a large scale. In October the lumber cut by American troops and American machinery reached the great total of 50,000,000 feet. Lumber produced by our saw mills alone during the war would build 600 continuous miles of 20-foot-wide barracks.

The map-making industry of France was wholly inadequate to supply our armies, and large, completely equipped printing plants were constructed. The base plant at Langres, France, had 10 rotary lithographic presses, four linotype machines and several presses, and employed 750 men, with 35 officers in charge.

It was an American engineer, Maj. J. N. Bagley, who invented the cartograph, or aerial-map camera, capable of photographing detail at a height of 5000 feet. Development of aerial photography made the importance of camouflage more pronounced, and the production of camouflage material soon required quantity methods and system. Consequently American engineers built a camouflage factory at Dijon consisting of 40 buildings, including a blacksmith and machine shop. This factory was declared to be the best equipped and most efficient of any on the western front.

Material Handled by Our Engineers in France

Item	Tonnage
General machinery	45,454
Iron and steel products	242,226
Hardware and hand tools	26,780
Railway rolling stock	343,888
Railway motive power	144,066
Lumber	39,086
Track materials and fastenings	488,793
Automotive transportation, etc.	22,127
Horse-drawn transportation	7,967
Building materials and supplies	98,671
Liquids	7,067
Explosives and accessories	952
Unit accountability	7
Engineer supplies	52,106
Miscellaneous office supplies	2,239
Floating equipment and accessories	10,093
Material and tools for locomotive and car repair and erection shops	10,407
Total United States	1,541,929

FROM EUROPEAN SOURCES

Item	Tonnage
Tools and equipment	462,027
Machinery	13,146
Office supplies and equipment	1,781
Auto and truck supplies	464
Track and ties	115,438
Locomotives and cars	8,649
Water supply, machinery	6,210
Water supply, supplies	48,416
Electric service, machinery	2,342
Electric service, supplies	4,083
Construction materials	188,830
Boats and barges	5,940
Motorcycles and bicycles	12
General engineer supplies	581,149
Cement from American expeditionary forces mills	54,860
Barracks	263,590
Bunks	9,892
Latrines	2,143
Miscellaneous	49,200
Total European sources	1,818,182
Total United States and European sources	3,360,111

Electrical Engineers Elect

At the annual business meeting of the American Institute of Electrical Engineers, held in New York, May 16, the following officers were elected for the year beginning Aug. 1, 1919: President, Calvert Townley, New York; vice presidents, Charles E. Skinner, Pittsburgh; John B. Fisken, Spokane, Wash.; N. A. Carle, Newark, N. J.; L. R. Jorgensen, San Francisco; Wills Maclachlan, Toronto, Can.; A. M. Schoen, Atlanta, Ga.; managers, L. E. Imlay, Niagara Falls, N. Y.; L. F. Morehouse, New York; and F. F. Fowle, Chicago; treasurer, George A. Hamilton, Elizabeth, N. J. The foregoing together with the following hold-over officers will constitute the board of directors for the ensuing year: C. A. Adams, Cambridge, Mass.; W. A. Del Mar, New

York; G. Faccioli, Pittsfield, Mass.; W. A. Hall, Lynn, Mass.; E. H. Martindale, Cleveland; F. D. Newbury, Pittsburgh; E. W. Rice Jr., Schenectady, N. Y.; Charles Robbins, Pittsburgh; Charles F. Ruffner, St. Louis; W. I. Slichter, New York, and Wilfred Sykes, Pittsburgh.

Compact Grinder Handles Heavy Castings

Many machine shops and foundries are confronted with the problem of grinding castings, that are too large to be held by hand, against a wheel mounted in the ordinary manner. Such work ranges all the way from grinding sprues and fins to the finishing of comparatively large surfaces that are to be filled and painted.

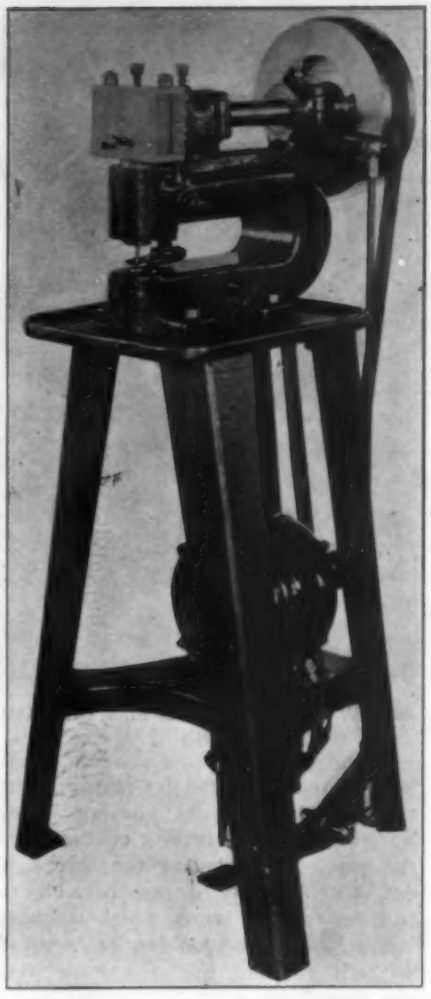
To provide a ready means for grinding castings of this type, the Grand Rapids Grinding Machine Co., Grand Rapids, Mich., developed the device shown in the accompanying illustration. This machine comprises three main units: A grinding wheel head, a connecting drive shaft and a base which transmits power from an overhead drive.

The base casting is mounted on a 3-point suspension which insures a substantial setting. The spindle bearing is of ample size and is equipped with ring oilers. The spindle is hollow to accommodate a sliding shaft which is necessary to give the grinding wheel a lateral movement. The sliding shaft is driven by the spindle through the medium of a key imbedded in the shaft and sliding in a keyway cut in the hollow spindle.

The outer end of the shaft is fitted with a universal coupling which gives the grinding wheel a swiveling motion, both sidewise and vertically. The universal joint is dust proof and is covered with a substantial guard. The machine uses grinding wheels 12 inches in diameter with 1½-inch face.

To insure working the wheel to its maximum output, the machine is driven by a 3-inch double belt. It is pointed out that the comparatively heavy grinding wheel shaft absorbs vibration, thus preventing pounding and chattering on the part of the wheel. It is said that the swiveling action of the universal joint allows the operator to force the wheel against the work at maximum pressure.

To secure the best results, it is pointed out that the work should be held on a truck-type casting carrier fitted with swivel castors. This arrangement makes it possible to move the castings easily and present them to the grinding wheel in the most convenient manner. The standard equipment of this machine includes the base, shaft, countershaft, counterweight, counterweight rope, rope clamps, swivel, swivel sheave pulleys, wheel guard, etc.



MACHINE FOR PROFILING SHEET METAL PARTS

Profiler Involves New Principle

On experimental work and in the manufacture of comparatively few machines at a time, the engineer is often confronted with the problem of making from 10 to 100 similar sheet metal parts. To make these one by one, by hand, is of course an expensive operation while the limited output desired does not warrant making special punches and dies. To provide means for handling this class of work, the Oliver Instrument Co., Adrian, Mich., recently developed the tool shown in the accompanying illustration.

In design, this machine closely resembles a punch press. It has a deep throat and a short stroke. It uses a round punch, equipped with a heel at the back that does not come out of the die during the profiling operation. This feature is for the purpose of keeping the punch and die in correct alignment.

The head is equipped with an eccentric adjustment which permits the operator to raise the punch clear of the die when setting the work in position for internal profiling. A template is first made the same shape as desired in the finished part. This template which is used for a guide, or leader, is doweled to the sheet metal to be profiled. The stroke is so proportioned that the punch clears the stock only and cuts into the metal until the template bears on the body of the punch. The work is guided by hand and passed under the punch until all the excess metal is cut away.

It is pointed out that it is impossible to overrun the finish line and that the work comes from the profiler

EQUIPMENT DESIGNED FOR GRINDING COMPARATIVELY LARGE CASTINGS—THE WHEEL IS MOUNTED ON A HEAVY SHAFT WHICH HAS LATERAL AND SWIVELING MOVEMENT

practically finished. The only subsequent operation consists of filing away any edge left by the punch. In working out the inside surfaces of parts it is necessary to drill a small hole to start the punch in. The machine is motor driven and is equipped with an interlocking switch and brake which causes it to run only when the operator's foot is on the foot pedal.

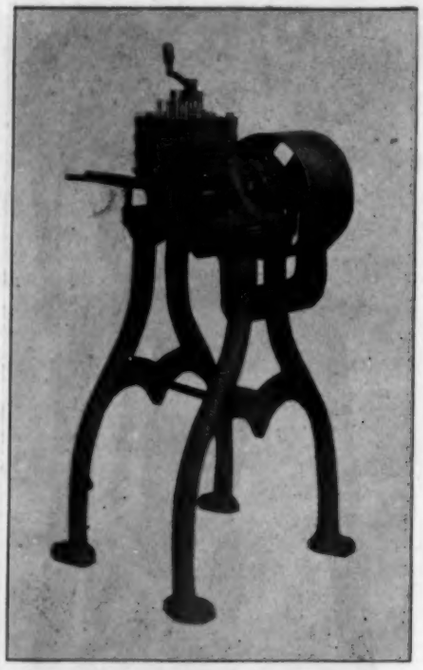
Threading Large Pipe

That hand-operated tools are not always confined to production work on comparatively small units is shown in the accompanying illustration. This machine is a pipe cutting and threading unit built by the Curtis & Curtis Co., Bridgeport, Conn. It is shown cutting a thread on a section of 15-inch wrought iron pipe. This is the largest size of wrought iron pipe to be found in standard lists and as the threads run eight to the inch, it is readily seen that the machine must develop considerable power to permit the threading operation to be carried out manually.

The machine is a self-contained unit carrying the die holder and the pinion shaft that rotates it, while the vise for clamping the pipe is located at the back. This vise is self-aligning, being operated through the medium of right and lefthand screws. Two screws are provided which are operated simultaneously by a hand wheel and spur gears.

The die holder has a spur gear cut on its periphery which engages a pinion. The pinion is mounted on a shaft which is operated by hand through the medium of a ratchet lever. As the die holder revolves, the gear recedes into its housing which brings the dies in cutting contact with the pipe. As soon as the thread is cut, the dies are drawn back by a turn of a cam ring which releases them. Thus the pipe can be removed without running the dies back over the thread.

The machine accommodates pipe from 4 to 15 inches and it is said that the largest size can be readily cut by one man. The dies, it is pointed out, are adjustable so that a thread can be cut larger or smaller than standard size to make allowances for irregularities in fittings. The cutting-off attachment is automatic in its feed and is said to cut the pipe off square without leaving burrs.



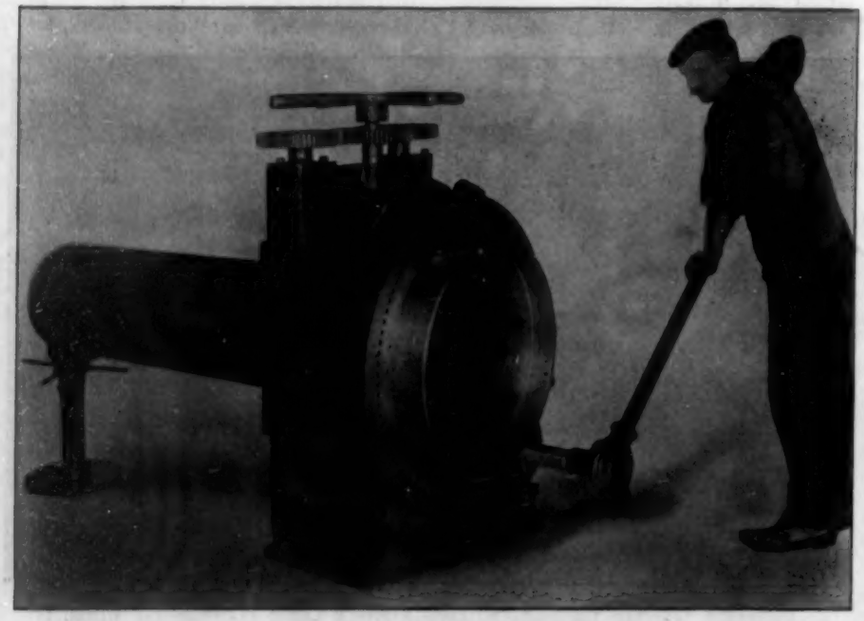
COMPACT STRAIGHTENING MACHINE FOR SMALL STOCK

Straightening Machine

In the accompanying illustration is shown a compact unit recently designed by Kane & Roach, Syracuse, N. Y., for straightening comparatively small-section pieces of round, flat and square stock. The straightening rolls are 1 3/32-inch diameter, 2 inches long and are spaced 1⅛ inches, center to center. Eight rolls are included, four upper and four lower, which are supported by journals at each end.

The upper rolls are completely encased and are raised and lowered by means of screws actuated through the medium of a hand crank. Gages are provided for adjusting the rolls, which, it is pointed out, permits the operator readily to ascertain if all the rolls align. The rolls are driven by cut spur gears. The roll speed is from 300 to 350 revolutions per minute, depending on the class of work being done.

It is said that the machine is well adapted for handling comparatively short pieces of stock, practically all the way from end to end. The machine is also used for straightening wire stock as it comes from coils. It is pointed out that the rolls can be made with any shape passes to accommodate special shapes of stock. The machine is driven through the medium of an overhead belt that operates a tight and loose pulley on the machine drive shaft.



CUTTING A 15-INCH PIPE THREAD BY HAND ON A SELF-CONTAINED PIPE CUTTING MACHINE

Waste of Coal Through Boiler Scale

The fuel conservation engineer of the United States fuel administration has issued an open letter dealing with boiler-scale prevention. In a table showing the insulating effect of scale, he gives information which may prompt consumers of fuel to take steps to prevent scale. This, it is said, can be done by removing the scale-forming elements from the water before admitting it into the boiler. The insulating effect of scale varies as the square root of its thickness. Comparing the coal wasted from every ton of coal burned with the average thickness of scale in the boiler, it is found: For 1-50 inch, 100 pounds; for 1/32 inch, 140 pounds; for 1-25 inch, 180 pounds; for 1-20 inch, 200 pounds; for 1/16 inch, 220 pounds, for 1-11 inch, 300 pounds, and for 1-9 inch, 320 pounds. Thus, a scale less than ⅛ inch thick causes a loss of 15 per cent of the fuel burned.

Institute Shows Business Cheer

Expectant Optimism Over Outlook in Iron and Steel Marks Largest Meeting in History—Judge Gary Predicts Greatest Prosperity—American Producers Invited to Visit Restored French Iron Fields Next Summer

CONFIDENCE is returning rapidly, especially during the past several weeks and a business situation which promises to develop into a period of surpassing prosperity for the iron and steel industry of this country is beginning to unfold.

This in substance represents the striking note sent forth by the fifteenth general meeting of the American Iron and Steel institute at New York, May 23. The meeting was characterized by a spirit of expectant optimism. While measured in tons the increase in actual orders, it was made clear, has not been pronounced, the common opinion was voiced that the mental attitude of buyers as to the expectation of lower prices, was changing into a more liberal disposition to take up future plans and requirements. Judge Gary in his opening address declared that confidence and patience would be rewarded by the greatest prosperity this country had ever seen. While the hopeful tone on the business outlook conspicuously contributed toward the success of the meeting, other important features appeared to make the gathering one of the most notable in the institute's history. Among these was a cordial invitation extended to the institute by Marcel Knecht, director of the official bureau of French information, to visit next summer the restored iron fields of Lorraine which American iron and steel has done so much to return to France. The possibility of conferences of iron and steelmakers of the world in the near future for the promotion of common purposes and benefits was hinted at in Judge Gary's address.

The attendance was the largest in history, numbering approximately 1300. For the first time since the institute has been holding its sessions in New York, the meeting place was not the Waldorf-Astoria but the New Pennsylvania hotel.

Review and Praise Industry's War Work

IN calling to order the evening's banquet, Judge Gary, as toastmaster, said he greeted the diners, "1300 strong." This represented the number in attendance or the largest by a considerable margin ever present on a similar occasion in the institute's history. Judge Gary complimented the institute on its growth, its spirit of cooperation and the service which it had been able to render the government and the general public when called upon. In one of his introductory remarks Judge Gary took the occasion to urge upon the younger men of the institute, and its coming leaders, the importance of dealing justly and generously with each other, with their employes, with their competitors and with the general public. In that way they will receive the greatest reward and will be trul patriotic, he said. "The war is over, but patriotism still lives," declared Judge Gary.

Joseph G. Butler Jr., in a carefully prepared paper set down in a historical form "American Steel's Part in the World War." Mr. Butler's address, in large part, is given on a succeeding page.

Robert S. Brookings, former chairman of the price fixing committee of the war industries board, eulogized the iron and steel manufacturers on the loyal and efficient service they rendered the government during the war. "I do not know what we would have done without your assistance in stimulating production in making allocations and above all in helping to stabilize prices," he said. He praised the voluntary character of the co-operation with the government of the iron and steel industry. Those abroad cannot understand how it was the people of this country voluntarily made so many sacrifices during the war and they especially marvel at the liberal conduct of industry in this regard. Mr. Brookings emphasized that the war industries board possessed no legal authority to compel iron and steel manufacturers to fix prices to the public. Supplies could be commandeered for the government but not for the general purchasing public. "When the history of this war has been written, it will stand as a monument to American manufacturers," said Mr. Brookings.

George W. Perkins made a plea for more vigorous action by American business men in educating the public to the changed conditions of competition that now prevail in the world and in bringing about effective governmental support. He said he believed the business men of the country should go to Washington and show the authorities in an unmistakeable way why co-operation must be established. He thought no organization was more fitted to undertake the leadership in this movement than the American Iron and Steel institute. He said the lessons of the past three years to be derived from the relations of government and business, clearly have proved their efficiency and the value of co-operation and that it would be a backward step to return to the conditions existing before the war.

Clarence H. Howard, president of the Commonwealth Steel Co., St. Louis, spoke of his impressions gained among the American troops abroad, a trip from which he recently returned. He described the fine spirit and capability of the American soldier shown in the army of occupation, with which he had spent considerable time. He dwelt upon the fellowship that had been created in the ranks and of its probable influence upon the life and relations of this country in the future. He thought that business could profit from this fact and declared that fellowship must be the keynote of the future in the human relations of industry.

Charles M. Schwab in a characteristic address spoke of the fine spirit of friendship among the American iron and steel manufacturers and urged their continued co-operation and fair dealing with each other. His remarks were in-

terspersed freely with examples of his ready with and story-telling ability.

In a spirited, eloquent address to which his auditors responded enthusiastically, Marcel Knecht, director of the official bureau of French information, expressed the debt of France to the American iron and steel industry for its vital aid in the defeat of Germany. "Two years ago," he said, "I asked you to bring your sword of steel to our help. I ask you today on behalf of our millions of dead and wounded, of millions of refugees and ruined populations, to have like us and all our great allies, a will of iron in the normal execution of the restitutions, reparations and guarantees which international justice will impose upon Germany.

"If we had had a Bismark or a Hindenburg at the peace conference the treaty would have been a treaty of iron; as it is, the allies only are imposing a treaty of broad justice," he said.

Great applause greeted Monsieur Knecht's invitation to the American Iron and Steel institute to visit France and the Lorraine iron and steel district on July 4 to 14 next, to see the recovered and rebuilt industry which American iron and steel had done so much to give back to his country.

At the conclusion of his address the entire assembly gave Monsieur Knecht a rising applause and his hand was clasped by various of the leading iron and steelmakers at his side. In that reception there was manifested clearly a spontaneous approval of the convictions which he had expressed and also an appreciation of the cordial spirit of France toward the American iron and steel industry as symbolized by the invitation to visit the restored Lorraine ore fields. Monsieur's address is given on an accompanying page.

The attendance exceeded all past records, numbering approximately 1300. The meeting place for the first time was the new Pennsylvania hotel.

After Judge Gary's opening address, Friday morning, the formal program of papers was begun by description of the work which the bureau of standards at Washington is carrying on in behalf of correct and scientific standards in manufacturing as well as in connection with government requirements presented by S. W. Stratton, director of the bureau. It is the tendency of the government, he said, in making purchases, to do away with any plan for hiding ignorance behind authority. Upon this basis the bureau has been built up and its field broadened. While he is placing a proper store upon the importance of correct government purchases, this phase of the bureau's work is of infinitely less importance than the value of the information provided for the benefit of co-operation with the bureau and suggested that the American Iron and Steel the general public, said Mr. Stratton. He sounded the need of more intimate institute appoint a committee to visit the laboratories at Washington from time to time to see that the problems of the iron and steel industry are being taken up. Mr. Stratton presented a number of slides demonstrating the lines of work being pursued and the equipments for doing it, in the government laboratories at Washington. "Electrically-heated Soaking Pits and Heating Furnaces" was discussed by P. F. Baily, president of the Electric Furnace Co., Alliance, O. This paper was discussed by W. G. Kranz, vice president of the National Malleable Castings Co., Cleveland, and by Prof. J. W. Richards of Lehigh university. The final paper at the morning's session was a description of the American Bridge Co.'s forge plant at Gary, Ind., by C. J. Walker, manager of the plant.

At the afternoon session, motion pictures were presented by Frank F. Marquard, superintendent of the by-product coke plant at Clairton, Pa., the largest installation of its kind in the world. Mr. Marquard described the plant as the pictures were run off. The paper of Henry D. Hibbard, consulting engineer, Plainfield, N. J., on "Present Knowledge Concerning Non-Metallic Impurities in Steel (Sonims)" was extensively discussed. Those participating were L. B. Lindemuth of Carney & Lindemuth, New York City; John A. Matthews, president of the Halcomb Steel Co., Syracuse, N. Y.; G. L. Kelley, and Frank B. Pato of the Otis Steel Co., Cleveland. Jacob A. Mohr, superintendent of the Carrie blast furnaces of the Carnegie Steel Co., Rankin, Pa., described "Methods of Charging Raw Materials Into the Blast Furnace." This paper was discussed by R. W. H. Atcherson, blast furnace superintendent of the Inland Steel Co.; by Harry S. Braman, superintendent of the blast furnaces and steel department of the Youngstown Sheet & Tube Co., and by R. M. McKay, superintendent of the blast furnaces of the Bethlehem Steel Co., Steelton, Pa. "Standardization of Shipbuilding Materials," an elaborate paper showing the purposes and the progress of the work along this line, prepared by F. T. Llewellyn of the Federal Shipbuilding Co. and the Chickasaw Shipbuilding Co., was given in synopsis form by the author. The paper "Notes on Open-Hearth Practice" by Henry M. Howe of Columbia university will be presented later.

At the meeting of the board of directors of the institute held Friday noon, the officers were re-elected as follows: President, Elbert H. Gary; vice presidents, Charles M. Schwab, John A. Topping and Willis L. King; treasurer, Edward Bailey; secretary, James T. McCleary. It was decided to hold the October meeting in New York which was something of a departure since that meeting usually had been held in some other city.

American Steel's Part in the World War

BY J. G. BUTLER JR.

WHILE each of the major participants in the world war on the side of the allies, had its opportunity of "holding the line" it was reserved for America and above all, for American steel, to win the Armageddon of the modern world. It was a war of steel. Men were helpless without steel in unlimited quantities and innumerable forms. It was this fact that made Germany and her allies formidable. Skill and resources for steel production are more highly developed in the United States and in Germany than elsewhere. Their combined production at the beginning of the war, exceeded that of all other nations. Until the forcible annexation of Alsace-Lorraine, Germany had but little iron ore and even the mines that stolen territory did not meet her needs at the beginning of the conflict. In 1913, she imported from France, Sweden and Spain, over 12,000,000 tons. Her 1913 production of pig iron was 19,004,002 tons. With this and the pig iron output of Austria-Hungary for that year added, Germany entered the conflict with an annual production of 21,339,192 tons.

The annual iron production of England, France, Belgium and Russia, during 1913 was 22,502,819 tons and considering the relatively large part of unrefined iron consumed by certain industries in Belgium, it is safe to say the war opened with the central powers and the allied nations about equally supplied with steel.

The violation of Belgium and the immediate occupation of northern France gave Germany vast additional

Abstracted from a paper read before the meeting of the American Iron and Steel institute, held at the Hotel Pennsylvania, New York City, May 23.

supplies and at the same time deprived her enemies of nearly half of theirs. Within three weeks after the war opened, Germany was in possession of the Longwy and Briey iron basins, in which were located 95 of the 123 French blast furnaces, together with 90 per cent of all French ore. Germany also gained possession of Belgium's blast furnaces and mines, adding 7,000,000 tons of iron to her steel production resources and at the same time reduced her enemies' resources to less than 15,000,000 tons. The steel production of the allies was reduced to less than half of that of their antagonists.

Toward the end of 1914, both France and England realized their extremity and orders for steel in large quantities began to come to the United States. At first orders chiefly were for barbed wire, shell and shrapnel bars. Later they covered almost every form of finished and semifinished material.

Iron and steel producers in America gladly responded to the appeals of France, England and Italy. Their part in the war began early in 1915 with the filling of rush orders for munitions material. By May production had reached about 80 per cent of capacity and by December had attained a rate of 38,000,000 tons annually, whereas in 1914 the production had been 23,332,244 tons as against 30,966,152 tons in 1913. The year 1916 was a duplicate of the latter part of 1915, except that prices advanced more rapidly. Iron and steel exports reached a total of 6,102,104 tons as against 3,513,453 tons in 1915 and pig iron production reached the then high record of 42,773,680 tons.

After he apparently had exhausted every resource to avoid it, the President finally declared war on April 7, 1917. Instantly the iron and steel industries, in common with practically all others, enlisted without reservation for the country's defense. Plants and resources were freely offered. The American Iron and Steel institute appointed a committee on steel and steel products with subcommittees to act in conjunction with and have special supervision over all branches of the industry. This committee agreed to supply the army and navy's bar, shape and plate needs at $2.50 and $2.90 per 100 pounds or about half of the prevailing prices. Similarly low prices were arranged on sheets and other materials. The amount saved to the government was not less than $15,000,000.

From this time forward the government and the industries worked together in perfect harmony. Prices were advanced to meet rising costs and to provide for the enormous taxes. The iron and steel men practically were permitted to manage their own affairs and alone were subjected to no arbitrary regulations and price fixing. It is true that certain basic prices were agreed upon between the war industries board and the general committee of the American Iron and Steel institute. These maximum prices prevented what is called a "runaway market" and formed the basis upon which the prices of finished products were computed, the computation being left entirely to the steel manufacturers.

The only point upon which the government exercised its right to dictate was the question of prices to our allies. Many manufacturers were of the opinion that a free foreign market should prevail. The majority however, approved of the plan to regard the allies in the same light as our own government in this respect and at a loss of many millions in profits, equal prices were maintained.

Confronted by a limited advance in prices, manufacturers continued voluntarily to raise wages until the earnings of their employes were the highest ever known. The successive wage increases during the three years ended Oct. 1, 1918, totaled considerably more than 100 per cent. The companies likewise bent every energy toward the financing of the war and because of the rapid advance in wages, particularly in the steel industry, wage earners in America were enabled to contribute a large share toward this phase of America's war effort. In certain districts iron and steel workers averaged $500 each in bond purchases in the first four campaigns. In one large steel plant in Youngstown, this average reached $600. In the accompanying summary is shown the participation of iron and steel officers and employes in military service and in the various war loans as reported by various companies.

SUMMARY

Number of companies reporting	181
Number of officers and employes of these companies who were in active service with army, navy or marine corps	76,450
Number of officers of these companies in voluntary or auxiliary service for war work	559
Total	77,009

Subscriptions to Liberty Loans

Loans	Company subscriptions	Employes subscriptions	Total subscriptions
1st Lib. loan	$30,415,940	$11,116,410	$41,532,350
2d Lib. loan	69,770,100	31,432,560	101,202,660
3d Lib. loan	61,064,350	37,563,837	98,628,187
4th Lib. loan	83,543,400	70,796,230	154,339,630
Victory loan.	49,012,500	30,383,600	79,396,100
Total	$293,806,290	$181,292,637	$475,098,927
Add unclass.	2,150,000	6,338,400	8,488,400
Grand total	$295,956,290	$187,631,037	$488,587,327

Many iron and steel men abandoned their own business voluntarily to give their attention to the government's pressing problems. A system of allocation for the industries was evolved which contributed much toward their efficiency in the nation's defense. As a result, practically all steel manufactured during the war was devoted to war purposes.

A feature of the part played by the American iron and steel industry in gaining the victory, was the tremendous increase in production achieved during its period of great obstacles. Much of this increase was made possible by new construction, undertaken in the face of almost prohibitive costs. Blast and open-hearth furnaces, plate and rolling mills and by-product plants were hurried into existence without regard to cost, in order that steel, benzol, etc., might be available. As a result, the rate of steel production at the time of the armistice had reached 47,000,000 tons per annum. Plate-making capacity during 1918 increased to 7,500,000 tons per year. The steel industry dedicated itself to produce as much steel as was physically possible to win the war. As a result those government officials in a position to know, have publicly declared that no part of the government's tremendous program was halted at any time because of insufficient steel.

The 1918 annual report of the United States Steel Corp. states that 18,439,460 tons of steel was furnished by it to the United States government and its allies. Based upon the relative capacity of the independent mills during the same period, the total amount of American steel used for war purposes was not less than 50,000,000 tons. The iron and steel industry furnished not less than 100,000 of its officers and employes for the national service and on a conservative estimate, the expenditures for increased productive capacity aggregated over $1,000,000,000.

The war now is over. There is reason to hope that history will never see another like it. But, without American steel, the cause of justice and humanity would temporarily have been lost and the world would have been at arms for generations to come. The American steel industry has, through its supreme effort in this most supreme cause, placed itself in a position from which it may find difficulty in extricating itself without a period of severe trial but it will meet the problems it now faces as it has met other problems in the past, with courage, energy and a vision worthy of its majestic power and inspiring history.

Economic Questions Sway World

International, Political, Financial and Industrial Thought Turns on These Factors—United States in Commanding Position—Great Prosperity is Assured—With Confidence and Patience Justice Should Rule in War Settlements

BY E. H. GARY

A GREAT change has come over the people of all nations since our last annual meeting. The world war seems to have terminated though the details of the peace terms have not yet been fully agreed upon. We may properly rejoice that negotiations have reached the point where it seems probable peace will be established, although we cannot as yet see clearly into the far future. Glancing back one year we may be thankful. The outlook in France and other parts of Europe was then very dark. We were anxious and distressed, but not without the courage of conviction as to final results. Right has triumphed. An overruling Providence has protected civilization against ruthless attack. All nations and peoples rendering service on the side of justice, faithfully and effectively performed their respective parts.

During the progress of the war we were frequently informed by representatives of the United States government, military and civil, who were in authority and directly connected with the purchase of supplies required for war purposes, that steel was of the highest importance and we were urged to increase capacity and to hasten production; we were requested to devote our time, money and energy in behalf of our government and its associates in the war to the exclusion of everything else. It was emphasized that if disaster was to be averted there must be additional war material, food supplies and transportation facilities, and that larger and larger quantities of steel were fundamental to all these means of carrying on the war. Repeatedly statements were made to us that the demands made for steel, both as to quantities and deliveries were impossible of fulfillment.

Never Became Disheartened

However, the manufacturers never became disheartened or demoralized. They listened patiently to the claims and reasons presented and then considered carefully all figures bearing upon the subject of necessities and ability to produce and made their calculations accordingly. Fired with feelings of patriotism, yet with composed minds and determined spirits, those in control of the iron and steel industry again and again promised that steel would be furnished when and as required for military purposes.

It is sufficient to say that in every substantial particular the iron and steel industry made good all promises.

Must Free Industry

OUR productive capacity is large and increasing. If given a fair opportunity to compete with other countries by the utilization of our natural resources, our producers will succeed in the race for success. When we consider the preparation other nations are making to advance their pecuniary interests in every part of the world we must conclude that to maintain the position which we are entitled to hold we must be unfettered by unreasonable or unnecessary restrictions. If business, big or small, shall deserve to succeed, it will be permitted.

There were no deficiencies in quantities nor delays in deliveries which were harmful. If these matters had been left entirely in the hands of the general committee of the American Iron and Steel institute there would have been no delinquencies whatever.

We may hope that our contact with the war, far behind but in steadfast support of the battle lines, has been of real benefit to us in our characters and dispositions; that our patriotic instincts have been broadened and sharpened; that our vision has been extended and illumined. We have been made to more fully realize our duty and responsibility in reference to the government, to each other and to all others who are connected with or interested in our affairs. We have been reminded in one way or another that we are selfish and sometimes greedy; that we are often narrow and unreasonable; that we are inclined to resent unfavorable criticism even though it is deserved.

We now have reason to assume the peace terms will be agreed to and subscribed at least by the majority of governments and that a league of nations for the continued preservation of peace will be established. A large majority of the people of all countries are favorable to these results and their desire and will must prevail. If the plan adopted, in form or substance, shall prove, by experience, to be imperfect or incomplete, corrections or amendments can be made later. If the plan turns out to be unworkable or unsatisfactory it can and will be abandoned. Naturally every one is wondering whether or not peace will be permanent or long continued. There are numerous things to be considered, too many for discussion or even reference at this time; but the controlling factor in this respect is one of fairness to all nations, taking all the facts and circumstances into account. If, at the start, either the treaty of peace or constitution of the league of nations is manifestly unjust and unfair to any leading country it will turn out to be a temporary arrangement only. Honesty, justice, truth and Christian spirit are all kindred to and have a bearing upon the idea of fairness.

At this particular time it is difficult for anyone connected with our side of the military conflict which has been raging to view the situation dispassionately. The precipitation of the war by the German leaders seems to us to have been unjustified and unconscionable; their conduct, brutal and remorseless; their treatment of captives and captured territory, cruel and diabolical; their disregard of law and right and human sanctity, barbarous and dastardly. This has outraged our feelings and inflamed our passions. It could not be otherwise.

Guilty Must Suffer

Nevertheless there must be maintained at present composure and judicial temperament having in view the long future and the vital welfare of the whole world. As we hate wrong, it is natural to hate those who perpetrate wrong, and we often entertain these sentiments without discrimination of persons. The leaders

Opening address delivered by President Gary before American Iron and Steel institute at New York.

of the German people, in control of affairs, civil and military, should be distinguished from the masses, who are responsible for the conduct of their leaders but not equally guilty of moral turpitude. Therefore the penalties imposed should be different.

Those directly connected with the cruel and criminal offenses against humanity during the war should personally receive adequate, even capital, punishment if and when deemed necessary, not in a spirit of vindictiveness or revenge, but as an example to deter others from the perpetration of crime which is recognized by civilized peoples to be the purpose of personal penalties. The citizens generally of an offending and conquered country, to the extent of their ability, should make full reparation and restitution for all the damage that has been inflicted, except and unless the same is waived in whole or in part. But as to punishment of the people at large of any country, which might result in unnecessary personal and physical cruelty and suffering, notwithstanding all are responsible for the acts of their official representatives, it seems to me the conquerors should be merciful.

Economic Questions Dominant

Believing the war ended and that peace will soon be declared, we instinctively turn our thoughts to the present and future economic situation. We realize that competition between the business men of this country and those of other countries and between ourselves, however good natured and friendly, will be persistent and aggressive. So far as the members of this institute are concerned, it will never intentionally be wanton and destructive. We have learned the folly and the wrong of such a course but we believe that the underlying reason for precipitating the late war was economic and that the question which is uppermost in the minds of many, if not most of the representatives at the peace conference is economic and that a desire for economic advantage and success will actuate the political, financial and industrial administrators of affairs of all countries in future decisions and efforts. We have established friendship with our neighbors across the seas which are genuine and lasting. This will result in benefit to them and likewise to us, but we should not be deluded into the conclusion that any of them will neglect an opportunity to extend influence or to secure trade or to profit even at our expense, so far as the same can be accomplished by legitimate means. This is their right and we cannot reasonably object. However, so far as it is proper we must be prepared to meet the competition that is sure to appear and we must be diligent, alert and vigorous.

As between ourselves, we believe thoroughly in competition but in cooperation as often expressed. We believe in this before, during and after the war. It is a principal that will not yield to destructive forces, although it is sometimes selfishly forgotten.

Whatever may be the facts relating to the past let us this very day resolve anew that for the future we, who represent large interests and are recognized as important factors in industrial life, will demonstrate that our aim is to treat thoughtfully and fairly every interest, private or public, that comes within range of our responsibilities or influence. This is not said in a spirit of repentance or accusation. No past act or omission is in mind.

All our industrial lines should be placed and maintained on a parity with other successful countries. To the extent that private enterprise receives protection, assistance and advantage by the laws or rules of other countries, the same should be afforded by our laws and rules so as to place us on a parity of cost in production and transportation. It is time that industry and enterprise in the United States shall be encouraged and protected instead of being attacked, interrupted or destroyed. Our nation, now the leader, financially, commercially and industrially, may be continued in this position or compelled to occupy a lower place depending upon the attitude of our own people, in official or private life.

Since the armistice was signed, the steel industry has made two substantial reductions in its selling prices, first by voluntary action on Dec. 9, and then March 21 after consultation and discussion with members of the industrial board of the department of commerce. There are incidents connected with the efforts of the secretary of commerce to stabilize conditions which interfered more or less with business activity. You are familiar with this subject. At present there is perceptible a gradual improvement. It seems probable this will continue and increase. On the whole, our business during the last six months has been better than we had reason to expect. After what has occurred during the last few years, it is wonderful that conditions are so good. As I have said before more than once, there is large and fairly profitable business ahead.

Carriers Will Buy

As you are aware, the wheat crop of this season is enormous—far above previous calculation—and it will soon be harvested, threshed, transported and converted into cash. This will provide business and money for the carriers. What they will do with it I cannot say, but they probably will make some necessary improvements in roadbed and equipment. Other crops will soon be coming on.

From present appearances, production of food this year will exceed all former records. The price of copper is increasing; it is expected to be selling in the near future at 20 cents. Most, if not all of us, are making expenditures in preparation for the future business that is coming.

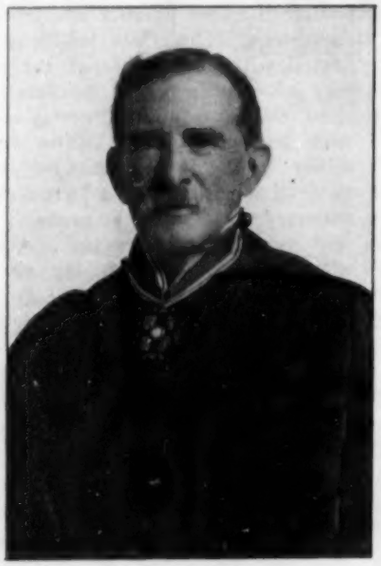
Gentlemen, the people of this country are rich and growing rich. It is estimated the wealth of this country is equal to one-third or more of the total wealth of all countries; that there is held by the banks 15 or 16 billion dollars; that the money in circulation is about $56 per capita, as against about $34 before the war. What is it to be supposed will be done with is? Why, invested and expended in order to increase wealth. Perhaps you and I will get some of it, and if so we will expend or invest it for we are like other human beings. There is still room in this country for the optimist, but little space for the pessimist. If the tax assessor and collector will only permit us to retain a little fairer percentage of our earnings we shall be happy; and we are beginning to see a gleam of light on this subject.

Patience and confidence are justified, and with those, great prosperity is assured.

World Meeting Hinted

MANY of us remember with sadness our conferences with German and Austrian steel masters at Brussels. They were agreeable and satisfactory. It is within the bounds of possibility that representatives from all the steel-producing countries of the world may hereafter, perhaps sooner than we now expect, meet to consider how best to advance the interests of all. We have never had business differences with any of them which would prevent our welcoming such a meeting. We would be fair, frank and honorable and, of course, would expect and exact reciprocal treatment.

Institute Speakers Authorities on Subjects



DR. HENRY M. HOWE
Professor Emeritus, Columbia University

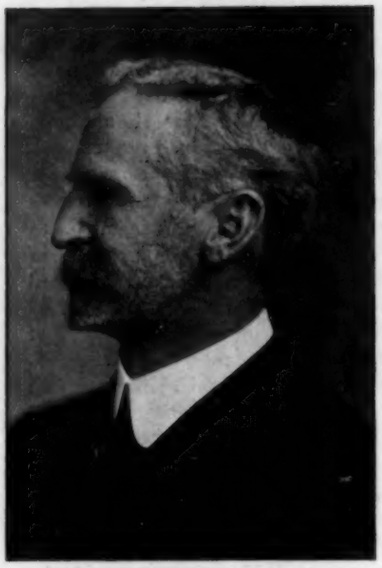
HENRY MARION HOWE, professor emeritus, Columbia university, Bedford Hills, N. Y., who presented some notes on the open-hearth practice, was born in 1848 in Boston, graduated from Harvard college in 1869 and from the Massachusetts Institute of Technology in 1871. He went to Chili in 1877 in connection with copper smelting works, and subsequently designed and built the works of the Orford Nickel & Copper Co., at Capelton and Eustis, Canada, and also those at Bergen, N. J. He was appointed professor of metallurgy in Columbia university in 1892. His standard work, "The Metallurgy of Steel," was published in 1890, in recognition of which he received the Bessemer gold medal from the Iron and Steel institute.

F. F. MARQUARD
Superintendent, By-product Coke Works, Carnegie Steel Co., Clairton, Pa.

HENRY D. HIBBARD, who contributed from the vast fund of his experience the paper "Present Status of Nonmetallic Impurities (Sonims) in Steel" is a consulting engineer, chiefly on metallurgy and working of steel, with offices in Plainfield, N. J. He was born in 1856 in Massachusetts, graduated from the Massachusetts Institute of Technology in 1877 and traveled extensively abroad, living at times in Norway and Australia. In the many years of his private consulting practice he has helped to successful completion numerous important projects and his work has contributed materially to the progress of the engineering profession in metallurgical lines. He is a member of the American Institute of Mining and Metallurgical Engineers, American Institute of Mechanical Engineers and American Society for Testing Materials.

FRANK F. MARQUARD, who presented a paper on the operation of the by-product coke plant of the Carnegie Steel Co., at Clairton, Pa., the largest in the world, of which he is superintendent, began his professional career in 1898 as chief chemist for the American Steel Casting Works, Sharon, Pa. He was superintendent of the Semet-Solvay By-Product Works, Sharon, in 1899, chief chemist and metallurgist for the Sharon Steel Co., from 1891 to 1901, superintendent of the by-product coke works, Farrell, Pa., from 1902 to 1916, and has been superintendent of the Clairton plant three years. He is a member of the Western Pennsylvania Engineers society and is secretary and treasurer of the Sharon Machine Co., Sharon, Pa.

C. J. WALKER, who delivered an illustrated paper describing the erection and operation of the new $5,000,000 forge, machine and heat treating plant of the American Bridge Co., at Gary, Ind., was in charge of the erection of the plant and is now manager of operation. He is a graduate of Lafayette college, engineering department, class of 1904. For several years after graduation he was employed in the engineering and erection department of the General Electric Co. In 1910 he became associated with the American Bridge Co., as master mechanic and electrical engineer at the Gary plant.



HENRY D. HIBBARD
Consulting Engineer, Plainfield, N. J.

C. J. WALKER
Manager, Forge Plant, American Bridge Co., Gary, Ind.

Contribute Freely From Fund of Experience

T. F. BAILY
President, The Electric Furnace Co., Alliance, O.

T F. BAILY, who presented a paper on "Electrically-Heated Soaking Pits and Heating Furnaces," is president of the Electric Furnace Co., Alliance, O. He is the inventor of one of the most successful types of resistance furnaces and has been prominently identified with the development of electric furnaces of special types for heat treating and for meeting difficult melting problems in practical steelworks experience. His work along this line has contributed largely to progress in this branch of the steel industry.

JACOB A. MOHR, superintendent of the Carrie blast furnaces of the Carnegie Steel Co., Rankin, Pa., who presented a paper on "Methods of Charging Raw Materials Into the Blast Furnace" has had a long and varied career in chemistry, metallurgy and allied sciences. Born in Merchweiler, Rhenish Prussia, Dec. 16, 1870, he went to work in a chemical laboratory at the age of 12. Chemistry held for him a strong fascination which led to diligent application, practically all of his knowledge being gained in the school of experience and by private instruction. Entering the employ of the Carnegie Steel Co., he became chief chemist of the Carrie furnaces, then assistant superintendent and finally superintendent, June 1, 1905, having held this position 14 years. Broad experience and practical knowledge qualified him to discuss in an instructive manner the subject to which he was assigned.

DR. S. W. STRATTON, director of the bureau of standards, Washington, who presented a paper on the bureau's work, is a graduate of the mechanical engineering department of the University of Illinois. He also taught at the university. When the physics department of the University of Chicago was established he accepted a place on its faculty. He served in the Spanish-American war and later upon invitation of President McKinley founded the bureau of standards. He drafted the bill creating the bureau in 1901 and for 18 years the bureau, first under the department of commerce and labor and later under the department of commerce, has developed along lines originally worked out by its director. Without authority to enforce its opinions or judgments, the bureau has expanded through the medium of co-operation. Dr. Stratton is a member of the International Committee on Weights and Measures, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Physical society, the American Philosophical society and the American Academy of Science.

JACOB A. MOHR
Superintendent, Carrie Furnaces, Carnegie Steel Co., Rankin, Pa.

DR. S. W. STRATTON
Director, United States Bureau of Standards

F T. LLEWELLYN, whose paper on standardization of shipbuilding material carried the weight of much practical experience, was born near Cardiff, South Wales, so long ago, as he himself says, he does not remember the exact date. He is a graduate of the University of London, Eng., and the University of Minnesota, and since he came to the United States 29 years ago has been connected with the United States Steel Corp. or companies it has absorbed. He was with the American Bridge Co. until 1906 when he was transferred to the Carnegie Steel Co., as engineer in its New York office. He was connected with that office until January, 1918, when his services were loaned to the Federal Shipbuilding Co., to help this company in connection with material and equipment for its new yards and ships at Kearny, N. J. In June, 1918, he was asked to aid the United States shipping board of the Emergency Fleet corporation, with headquarters in Washington and later in Philadelphia. Among other duties he was given charge of the standardization of steel, and continued at this task until December, 1918, when the cessation of hostilities made it no longer necessary to handle the Emergency Fleet steel requirements from headquarters. In that month he returned to the United States Steel Corp.

France Relights Its First Furnace

Resumption of Damaged Plant at Senelle Maubeuge is Pointed to as Symbol of the Country's Economic Revival—American Iron and Steel Institute Invited to Visit French Iron Districts Next Year—Thanks American Steel

BY MARCEL KNECHT

IN 1917, I had the honor of reading to you a message from our high commissioner. Andre Tardieu, who praised your splendid co-operation in the war. I also appealed to you for a closer union between the steel industries of France and of the United States, and, as a Lorrainer of Nancy, and member of the board of directors of the Industrial Institute of Eastern France, I expressed the hope that our two steel weapons would win the decisive victory

Mr Butler and Mr. Brookings, who have just praised the unselfishness of the steel industry of the United States in its valuable co-operation with your government, will allow me to add the sincere thanks of France; we also wish to pay tribute to your foresight and to the generalous conception which equalized the prices for all the allies. The iron of Minnesota and Alabama, the steel of Pennsylvania and Ohio, have liberated the iron of Lorraine and made it French again.

"The first engineer who foresaw the extraordinary future of our eastern industries was the deputy from Briey, Albert Lebrun, who, as an artillery officer in 1915, was often obliged to order shelled these mines, his birthplace and his creation, and who later became minister of blockade and of the liberated industries of France.

Germany Stole the Gate

Mr. Lebrun said in 1909 that nature had already conceived Lorraine as a whole when forming its underground in complete harmony. The part of Lorraine occupied by Germany was separated from French Lorraine by a frontier; but, deep in the soil the iron had mines extending from Nancy, Verdun, Briey, Longwy to Luxembourg and Metz; coal was to be found between Pont-a-Mousson and the Saare district; salt was exploited from Nancy to annexed Dieuze and Chateau-Salin. Our mines could be compared to a gigantic hinge strongly fixed to the French ground: the gate which it had before 1870, the gate of Metz and Thionville, had been stolen, but the hinge remained as a hope and a testimony.

As I asked you two years ago to bring your steel sword to our help, I ask you today, on behalf of our millions of dead and of wounded, of millions of refugees and ruined populations to have, like us, like all our great allies, a will of iron in the normal execution of the restitutions, reparations and guarantees which international justice will impose upon Germany. If we had had Bismarck or Hindenberg at the peace conference, the peace treaty would have been a treaty of iron; the delegates of the allies are only imposing a treaty of broad justice against the German bluff; let us unite our iron will against German insolence, against German hypocrisy, let us be as just to the pitiful victims of German brutality as to the torturers.

The economic situation of France and of Belgium, burned, crippled, ravaged, is much worse than that of Germany. Mr. Vanderlip and Mr. Davison have already described the hardships of Europe. France has won an immortal, spiritual, moral and military victory. The last speaker described with enthusiasm his joy when, visiting Coblenz he saw the Star Spangled Banner floating on a German fortress, formerly the laboratory of the lowest form of culture. Close to Coblenz the French flag decorating the fort of St. Quentin, in Metz, has cheered and comforted my nation. But the people of France do not deserve to suffer an economic defeat and, with your brotherly help, they are going to do their best to improve our financial and industrial situation. The north and east of France are still ruins and tombs. Our steel furnaces of the north and of French Lorraine are no more and, still we see across the Atlantic ocean the first star of hope. It is the same star which the three kings saw in Bethlehem; it is the same star which the French nation admired when Pershing and your first crusaders reached our shores; it is the same star which the allies cheered when Foch was chosen by Clemenceau, by Wilson and Lloyd George.

The symbol of the economic revival of France is the recent relighting of the first steel furnace of northern France. Mr. Loucheur, minister of industrial reconstruction, and Albert Lebrun, minister of liberated districts, who can be compared to Judge Gary, to J. A. Farrell, to Charles M. Schwab, officially attended the ceremony at which one of the furnaces of Senelle Maubeuge was put again in action. The director general of the company of Senelle, M. Dondelinger, after having described the enormous and systematic destructions, thefts and looting by the Germans in his plants, announced that the valuable help of the French government and the patriotism of the engineers and workmen permitted them to relight this furnace, the first which would aid in again producing steel for France. Minister Loucheur, who was deeply moved, praised the spirit of capital and labor, and expressed the hope that, even with the 8-hour day, production would be intensified, and that the steel industry of France would never work any more for war products steel.

First Furnace is Relighted

Gentlemen, we won because of our united steel; we will have a just peace because of our united will, and let us maintain peace and human happiness through our united iron and will.

There is no union between men if they have not been in touch individually. Why could not this powerful institute choose the month of July, 1920, to celebrate the glorious 4th and 14th of July and to visit the iron mines of Briey, Longwy, Moutiers, Pienne, Mont Saint-Martin, Homecourt; the steel furnaces of Joeuf, Hayange, Pompey? The leaders of industrial America would be warmly received by the industrial leaders of Lorraine, by the chambers of commerce of Nancy, of Metz, of Strasbourg, and by the industrial institute of eastern France. Our government, and particularly statesmen like Loucheur, Lebrun, Andre Tardieu, Marin, Francois de Wendel, deputy of Briey, and president of the Comite des Forges de France, would highly appreciate your coming to the district which represents the patriotism of greater France and its economic rebirth."

Address delivered at the banquet of the American Iron and Steel institute. Monsieur Knecht is head of the official bureau on French information.

Coke Made From High-Volatile Coal

Huge By-Product Coke Plant Consisting of 768 Ovens Requires a River Fleet for Transporting the Raw and Finished Product—Method of Coking and of Recovering the By-Products is Described

BY FRANK F. MARQUARD

IN the past few years there has been a wonderful awakening. The construction of by-product ovens has been greatly extended. Their merit as an essential industry in time of war, as well as peace, is now recognized by our government as of national interest, as well as of economic interest in the development of the iron and steel industry. In 1918 sixty million tons of coke were produced in this country—30,000,000 by the by-product ovens and 30,000,000 by the beehive ovens; and this year, 1919, will mark the turning point in favor of the production of by-product coke.

In planning the construction and operation of the Clairton by-product coke plant, the important questions carefully considered were, the location so as to effect maximum economy in the transportation of coal, gas and coke; the type of oven and recovery apparatus most effective for the production of the best metallurgical coke from the coking of 100 per cent high-volatile coal, and the market for the coke, tar, gas, ammonia, benzol, coke dust and domestic coke.

As to location, we have been extremely fortunate in having a site located north and adjacent to the Clairton steel plant of the Carnegie Steel Co. This site is 5200 feet long and 1800 feet wide, lying along the western shore of the Monongahela river, 20 miles south of Pittsburgh, and large enough for the construction of 24 batteries of 64 ovens each.

Consumption for 24 Hours

Twelve batteries, 768 ovens, are completed, with a daily coal consumption of 12,500 net tons of coal per 24 hours. Tne daily yield of this coal is as follows:

Daily production	Per cent yield Based on coal charged
8,000 N. T. furnace coke (2½% H_2O) ...	62 per cent
520 N. T. domestic coke	4.2 per cent
900 N. T. coke dust..	7.2 per cent
150,000 gals. coal tar....	12 gals. per N. T. coal
162 N. T. sulphate of ammonia	25 lbs. per N. T. coal
29,000 gals. pure benzol.	2.3 gals. per N. T. coal
7,400 gals. pure toluol.	.57 gals. per N. T. coal
2,800 gals. crude light solvents	.22 gals. per N. T. coal
1,400 gals. crude heavy solvents	.11 gals. per N. T. coal
75,000,000 cu. ft. surplus gas	6000 cu. ft. per N. T. coal

In order to handle these large quantities of coal and coke, we found it necessary to construct a river fleet of 120 barges and seven tow-boats to transport our coal from the mines to the ovens; 8 miles of main-line track and 20 miles of yard track; a 40-inch gas line, 9 miles long, to deliver the gas to Duquesne, Homestead, Edgar Thomson and Clairton Steel Works; seventy-five 10,000-gallon tank cars for tar and benzol; 500 steel-hopper coke cars; coal storage yard of 250,000 net tons capacity, to take care of a possible interruption in our river traffic in winter months and to assure uniform oven operation, etc.

The coking of 100 per cent high-volatile coal for the production of suitable metallurgical coke has not yet passed beyond the experimental stages when the Clairton plant was designed and considerable interest was centered upon the performance of the blast furnaces using this by-product coke made from 100 per cent high-volatile coal. The results obtained at the Clairton Steel Works blast furnaces soon demonstrated that the coke could be used successfully in place of beehive coke. Not only did these furnaces increase their production of pig iron, but they did so on a lower coke consumption; and the larger blast furnaces of Duquesne and Edgar Thomson, after some preliminary adjustments, quickly responded by increased production and low-coke consumption in a manner most satisfactory.

The Clairton plant is equipped with two electrically-operated coal hoists, each hoist consisting of two 5-ton hoisting buckets having a lifting capacity of 500 tons per hour. The coal is lifted from the barges and dropped into a 150-ton hopper, from which it is spread over a shaking screen to roll-crushers. Approximately 60 per cent of the coal passes through the shaking screens, the oversizes going through the rolls, leaving the rolls to crush only the large lumps.

The coal after it leaves the crusher is mixed with the fines that pass through the shaking screens and is fed on a rubber belt then conveyed up a 15-degree incline to bunkers. The 12-battery plant is equipped with four bunkers, each bunker having a capacity of 4000 tons of coal. Each bunker supplies three batteries. The coal is drawn from the bunker into larry cars. These larry cars are equipped with four cone-shaped hoppers, the capacity being sufficient to fill one oven which requires 13.3 net tons of coal per charge. It is important in the charging of the ovens to see that the oven is filled to its fullest capacity, for the reason that not only do we secure thereby the maximum production of coke per oven but we limit the gas space in a manner which allows the gas to pass out of the oven quickly without lingering in contact with heated walls, such as would be the case where ovens are irregularly filled. The charging and leveling of the coal in the oven requires approximately one and one-half to two minutes, during which time the gases are allowed to escape. As soon as the coal is leveled the lids are properly secured and the gas from the ovens is then allowed to pass up through the ascension pipe into the collecting main.

The ovens are Koppers standard 500 cubic foot ovens, 37 feet face to face of doors, 17 inches wide on the pusher side and 19½ inches wide on coke side, 9 feet 10 inches floor to roof and 9 feet floor to top of coal when charged. They are individual cross-regenerative type, having 16 vertical flues on the pusher side and 14 vertical flues on the coke side, all connecting into a common horizontal flue near the top of the oven. Each oven has two independent air regenerating chambers.

Gas is Metered

That proportion of the gas which is returned to the ovens as fuel for heating same, is delivered to each battery through a venturimeter and then to a 20-inch main on each side of the battery. From the fuel gas main it is introduced alternately to each side of the ovens through gun brick made up of clay shapes having a 4-inch diameter hole and suitable outlets on top to receive a nozzle brick for each vertical flue.

The air for combustion enters the regenerator chambers under suction through air valves in the connection between the bottom-regenerator chamber and the side-stack flue. This inlet is

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Abstract of a paper presented at the annual meeting of the American Iron and Steel institute, May 23, 1919. The author, Frank F. Marquard, is superintendent of the by-product coke plant, Carnegie Steel Co., Clairton, Pa.

opened and closed by the automatic reversing mechanism—being open when the reversing damper on the same side is closed. The amount of air entering can be controlled at this point by more or less restricting the opening by the use of strips of steel called finger bars. The air passes up through the regenerators, is heated to 1700 degrees Fahr., and enters the vertical flues, where combustion takes place. Each vertical flue is continued above the horizontal flue to the top of the battery where it is covered by a cast-iron cap. This cap furnishes a means of inspecting each flue and also a means of changing nozzle brick or sliding brick settings.

Controlling the Amount of Draft

The draft on individual ovens is controlled by a butterfly damper in each air box. The latter connects the regenerators and waste-gas flue which leads to the stack. The butterfly dampers are set wide open for the regenerator farthest away from the stack end and are gradually contracted toward the stack so that each regenerator of the entire battery of 64 ovens is under the same draft conditions. Individual ovens, however, may be given more or less gas to compensate for variable conditions that may exist.

The gas is reversed every half hour by a clock energizing a motor-driven master control. The various steps in reversing are so timed that enough interval is allowed between each operation for the flues to clear themselves of any explosive mixtures.

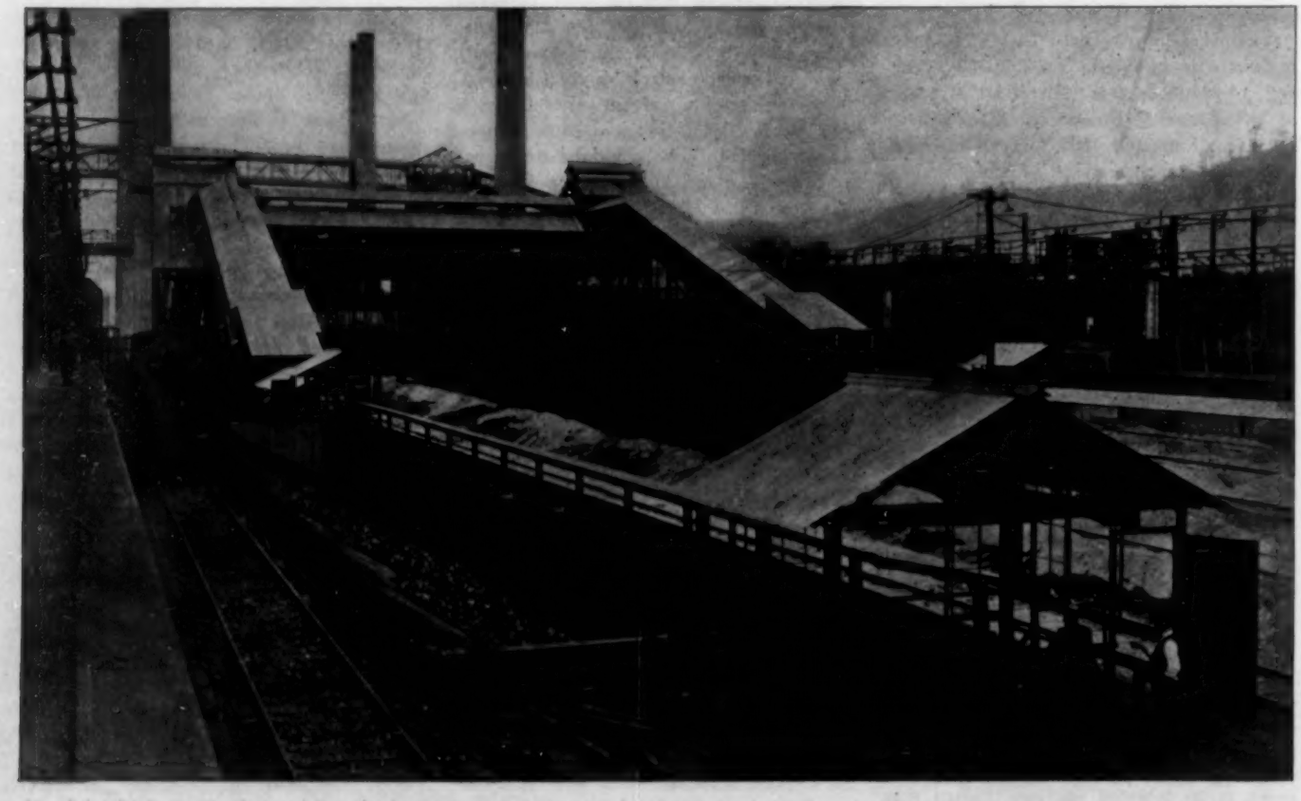
Inasmuch as the gas is introduced through the gun brick and nozzles, located in such position in the oven that they become heated to a point high enough to break up some of the fuel gas with the deposition of carbon, it is necessary to provide means of decarbonizing them. This is done by opening the cap on each gas gun several minutes after reversal on the opposite side, from which the gas is burned, allowing air to be drawn into gun brick and nozzles, burning the heated carbon.

After the volatile matter is all driven off from the coke, which at present is completed in 19 hours, and which can be accomplished in less time, the doors are removed and the coke is pushed into the quenching car and is brought under a spray of water and quenched for 45 seconds. In order to quench this coke in this time 6000 gallons of water per quench are required, 1000 gallons of which evaporate. It is important to quench this coke in a manner which will give a coke containing not more than 3 per cent of water. The coke is allowed to drain one minute and is then dropped upon a wharf. From the wharf it is fed onto a rubber belt which discharges onto a stationary bar grizzly screen, the various sizes of coke falling onto chutes into cars. The fines passing through the grizzly screen amount at present to approximately 18 per cent of the total coke discharged from the oven. These fines are rescreened through a rotary screen with ¾-inch wire mesh openings, where the larger sizes are separated from the dust. The larger sizes are available for domestic fuel, while 80 per cent of the dust is required to produce all the steam requirements for the entire coke and benzol plants.

The gas coming from the ovens enters a collecting main through ascension pipes and mushroom valves. The collecting main is U-shaped and so designed as to give the gas a speed of approximately 5 feet per second. The suction main is so designed as to give a speed of travel of approximately 15 feet per second. In order to maintain uniform gas pressure in the collecting main a butterfly regulating valve is inserted in the suction main and is controlled electrically. The gas leaves the ovens at an average temperature of 600 degrees Cent., enters the collecting main at 400 degrees Cent., and passes into the suction main at 200 degrees Cent.

Handling the Tar

The heavy tars are quickly condensed and drop out in the collecting mains and in order to prevent this pitchy tar from building up and stopping the mains, a constant stream of what is known as flushing tar is flooded through these mains. This flushing tar is a mixture of 50 per cent tar and 50 per cent ammonia liquor. This carries the heavy tar and such pitch as is formed to the end of the main, where the hard pitch



DISCHARGE END OF ONE OF THE BATTERIES OF COKE OVENS SHOWING THE QUENCH CAR, COKE WHARF AND SCREENING PLANT

is screened out and removed. The gases in their travel from the ovens to the primary coolers are reduced from 200 degrees Cent. to 75 degrees Cent. During the cooling, 70 per cent of the tar is condensed in the collecting mains before the primary coolers are reached, 20 per cent is condensed in the suction mains and approximately 8 per cent of the lighter tars and most of the water vapors, are condensed in the primary coolers. The temperature in the gas inlet to the primary coolers is 75 degrees Cent., while the outlet from the primary coolers is 28 degrees Cent. The liquor and tar are combined and the mixture flows to a circulating drain tank from which it is pumped to the tar-separating tank.

In order to maintain uniform operating conditions it is extremely important that the even temperature control of the gases be constantly maintained. After the gases are passed through the primary coolers, they are under a suction of 30 centimeters of water. After passing through the exhauster, the gas is raised in temperature by compression, from a suction of 15 inches of water to a compression of 50 inches of water. The gas is then passed through the tar extractors which eliminate the last traces of tar vapors by forcing the gas through finely perforated plates and allowing it to impinge upon a flat surface, which breaks up the little tarry mist into globules. The gas, thus free from the tar, is preheated to a temperature of 60 degrees Cent. and then passed through the lead-lined saturators containing a solution of 5 per cent sulphuric acid. The gas coming in contact with this acid gives up all of its ammonia which forms ammonium sulphate. After this acid bath becomes saturated, the crystals of ammonium sulphate fall to the bottom and are ejected with an air-syphon ejector and thrown upon a draining table. The mother liquor is returned to the saturator and the salt is periodically paddled into the centrifugal dryer.

The salt is built up on the walls of this centrifugal dryer to the extent of 4 or 5 inches and is whizzed for a period of 15 minutes, after which it is washed with a small quantity of hot water and whizzed for another few minutes. The dryer is then stopped and the salt is scraped off the copper screen by means of copper paddles. A rubber conveying belt discharges the salt into a revolving air-heated dryer in which the moisture is reduced from 2 per cent to less than ¼ of 1 per cent.

Practically all the sulphate of ammonia is used as a fertilizer—in some cases blended with bone dust and in many cases used without mixing with bone dust or phosphates or other fertilizing mediums. It contains approximately 5 per cent of combined water and 3 per cent of free water, making a total of 8 per cent of water. This water is condensed and dissolves out of the gas and the tar a certain amount of ammonium sulphide and ammonium carbonate and practically all of the chloride of ammonia. Thus the ammonia which is taken out of the gas by this water amounts to approximately 20 per cent of the total ammonia content of the gas.

Reclaiming Ammonia

This weak liquor, as it is called, contains about 1 per cent of total ammonia. The liquor is separated from the tar by gravity, in separating tanks, and is put through ammonia stills where it is brought in intimate contact with a solution of lime water and steam. The lime combines with the ammonium chloride forming calcium chloride. The ammonia is driven off as a gas and is led through cast-iron pipes into the gas mains before the saturators, thus, all being converted into sulphate of ammonia. If, however, there is a market for concentrated ammonia liquor, the ammonia gases from the ammonia stills, instead of being conducted to the saturators, are condensed into liquor and sold as 20 to 25 per cent solution.

The tar, after it has been allowed to settle and the ammonia liquor separated (which takes place by gravity), is then loaded into tank cars of 10,000-gallon capacity. Most of the tar is shipped to the open-hearth and heating furnaces, where it is burned with coke-oven gas.

After the gas passes the ammonia saturators, it is passed through final coolers where it is brought in direct contact with a water spray and cooled from 60 to 25 degrees Cent., at which temperature it is passed through the oil scrubbers.

These oil scrubbers, arranged three in a series, are 16 x 100 feet, filled with wooden grids for 80 feet in such a manner that the oil which is trickling down through the grids from a series of 24 sprays at the top comes into intimate contact with the gas. The wash oil, as it is called, absorbs the benzol vapors from the gas. These oil scrubbers are so designed that the gas will have a speed of not under 3 feet per second and a time of contact through these series of three scrubbers of not less than 60 seconds. In this manner 90 to 96 per cent of all the benzol vapors are extracted from the gas at a temperature of 25 degrees Cent. and the oil will have a saturation of 2.5 to 3 per cent of benzol and its homologues.

The gas, after it has been debenzolized, is metered and after which it passes to a 100,000 cubic foot regulating holder. Forty-three per cent of this gas is required for heating up the ovens, while the remaining 57 per cent which is designated "surplus gas," is sent to the booster station where it is boosted by steam-driven turbines to a pressure of 7 pounds and delivered through a 40-inch gas main for a distance of 6 to 9 miles, supplying gas to the steel mills at Clairton, Duquesne, Homestead and Braddock.

The wash oil, thus saturated with benzol and its homologues to the extent of 2.5 to 3 per cent, is pumped to the wash oil stills at the benzol plant, where it is heated up to a temperature of 150 degrees Cent. through superheaters, then led into the wash-oil stills where it is brought into contact with live steam where the benzol vapors are driven out of the wash oil. These are condensed and separated from the water and form what is known as light oil. The wash oil, thus debenzolized to a point where it contains less than 0.3 per cent light oil, is cooled off through pipe coolers and returned to the scrubbers to take up another load of benzol.

The light oils coming from the light-oil stills, contain approximately 8 per cent of wash oil and naphthalene. This wash oil and naphthalene are removed by distilling the light oils in an intermittent still known as a crude still thus, approximately 92 per cent of the benzol and its homologues are distilled off, leaving a residue of naphthalene and wash oil. This residue is drawn into a decanter tank and forced by air pressure into cooling pans where the naphthalene is crystallized out and the wash oil is returned to the circulating system.

In this crude distillation the total benzol fractions with the exception of the heavy No. 2 solvent are combined, while the heavy solvent is separated. The combined benzol fractions are then pumped into a lead-lined agitator which is capable of holding 10,000 gallons of crude benzol. Then 0.4 pounds of 66-degree sulphuric acid per gallon of product is added (acid being added in small quantities) and the content is agitated for a period of three hours, after which the sludge, which consists mainly of thiophenes and unsaturated hydrocarbon compounds, is removed and drawn off into an acid pot. After the benzol is sufficiently washed with acid, which is determined by laboratory tests, it is then washed with water and neutralized with a 10 per cent solution of caustic soda. The water and the caustic soda are drawn off and this washed-benzol product is then pumped to the pure stills where the product is either fractionated into pure products or refined into mixed products, according to the market requirements. The loss sustained in washing amounts to 9 per cent of the product washed, while the loss sustained in the pure stills amounts to 8 per cent of the product in residue and noncondensable gases.

Spotlight on Employment Problems

Many Features of Industrial Relations Discussed at Employment Managers' Convention —Warning Sounded Against Overdoing "Industrial Democracy" Idea— Present Federal Employment System Opposed

EVIDENCE of the great and growing interest in problems of industrial relations was emphasized by the attendance of 1200 delegates at the first convention of the National Association of Employment Managers in Cleveland, May 21-23. Every conceivable question into the selection, placing, promotion, payment and education of workmen; the relationship between employes and employers and their responsibilities to one another and the community was touched upon in addresses by a score or more of speakers.

One of the features of the convention was the taking of a ballot on the continuation of the United States employment service. One question on the ballot follows: "Do you favor the continuation of the United States employment service as organized for the war emergency?" On this question 275 delegates registered themselves as opposed and 62 in favor. The second question was: "Do you favor trying the experiment of a federally directed employment service so organized that it will properly serve all the elements of the community?" On this question 210 delegates voted "yes" and 140 voted "no." The questions were not discussed in convention.

What might have been considered a reactionary attitude was expressed by W. A. Greives, Jeffrey Mfg. Co., Columbus, O., in sounding a note of warning against carrying the systems providing for "industrial democracy" to extremes. His plea for the exercise of common sense, and the establishment of confidence and fair play as the fundamentals of industrial relations was applauded as voicing the sentiment of the organization.

In opening the convention, the president of the association, S. R. Rectanus, American Rolling Mill Co., Middleton, O., emphasized the fact that the employment managers recognize there is a definite work for them to perform, that they are not visionaries but men trying to discover what the real problems are and then to apply the remedy. Most of the speakers stressed the importance of co-operation between the employment manager and foreman.

The influence of personnel work in the United States army was clearly discernible and it was stated that this work did more to promote interest in the employment manager and the solution of his problems than developments in the decade previous to the war. Classification cards to be held by employes, service certificates, certificates of grades or rank and other means were suggested so that there might be co-operation between employers in hiring and placing men. One speaker suggested the possibility that in the near future the work will be narrowed down to selecting prospective employes only for vestibule schools, the foremen being held responsible for them after their promotion to work in the shops.

Opportunities and Pitfalls Emphasized

THERE is a misconception that morale can be bought, that it can be brought about by various systems of industrial democracy; but morale is the effect of right action and wholesome environment," said W. A. Greives, assistant secretary, Jeffrey Mfg. Co., Columbus, O.

"Evidently an attempt is being made to alarm the employers of this country to the dangers of industrial unrest, but I for one refuse to be stampeded. There are great forces making for common justice between employe and employer which have been in operation for ages, and they are not going to be thrown aside at the behest of a few hot-headed Bolshevists, or light-headed labor leaders.

"Let us have as much industrial democracy as we can assimilate and no more. It is going to be just as disastrous for us to go to the one extreme as the other. I realize that my remarks may be considered reactionary in view of what has been said here, but unless we go slow in this direction there is just as much danger as in not moving at all.

"We have an example in Russia where they have too much of a very good thing—democracy. While I am for the broadest kind of industrial democracy I cannot overlook the experience that we as American citizens have had in the past. It is demonstrated that we want a great deal, which when we get it we don't care so much about. An example of this is the primary which was advocated some years ago as a solution of many of our problems, and the abolishment of which is advocated just as strongly now by some political economists in the interest of 'a better form of government.'

Wanted—a New Idea

"This so-called industrial democracy is nothing new; the plot and theme have been on the boards for many, many years. I have not heard expressed at this convention a new idea for the improvement of industrial relations and I think if any should be suggested we should give the man who suggests it a hearty vote of thanks.

"Co-operative activity was born with industry, and, as I see it, all the problems which we have now to consider focus attention on the value of confidence and the square deal. It is not necessary to start an industrial revolution in this country to establish these. The baker uses a little yeast to make good bread, but that does not signify that the more yeast he uses the better bread he bakes. Similarly the proper proportion of this thing we call industrial democracy may be just the leaven we need.

"Confidence is the foundation of morale. Show me an organization where justice prevails and I will show you an organization where the workers don't care if they have a system of industrial democracy or not. These systems and methods for the government of workers may be new, but the principles for establishing con-

fidence and the square deal are eternal."

E. Elmo Martin, educational director, Willard Storage Battery Co., Cleveland, cautioned the employment managers against concentrating their attentions on the matter of selection to the neglect of other and far more important problems. He illustrated his talk by drawing a small circle on the blackboard to represent selection, a larger circle to represent training, a still larger one for payment and the largest to represent management.

"There you have the relationship of these various factors in the proper order of their importance," he said. "Don't get so close to the little circle that you can't see the big one.

"We must give the worker a better understanding of the system for compensation and its relation to profit, and only by means of a fair arrangement and a good understanding of it will the worker be satisfied. In compensating a worker an equal appeal must be made for quality, quantity and economy. Some of our present methods distribute payment unequally, and this is the fault with some piece work systems; a premium is put on quantity, and as a result quality and economy suffer.

"The greatest problem of all that we have to deal with is the education of the foreman. Why did we go 3000 miles to fight autocracy when we can fight it right in our own factories? We need but step into some shops to brush elbows with our own autocrats. A competent foreman should receive the proper backing, but there should be no place for the foreman who will exercise authority over men without proper understanding of their rights and the company's rights. Industry is coming to look more and more for the right qualities in foremen."

The Psychology of It

"Seven methods of judging trade skill are fairly well differentiated," said Walter Dill Scott, president, The Scott Co., Philadelphia, industrial personnel advisor, and who was identified with placement work in the United States army.

"The methods relate to years of experience, records, reports and credentials; the applicant's own statement; answers to questions by the trade expert; an unsystematized and unstandardized trade test; a systematized but unstandardized trade test; standardized and systematized trade test, and appearance. The methods of measuring intelligence may for our purpose be reduced to four classes: Appearance, schooling, accomplishments and psychological tests.

"Since psychological tests are new and since they are more or less shrouded in mystery they are likely to become fads during the next few years and to be used indiscriminately and harmfully."

"A great deal of misunderstanding can be prevented by the proper use of the job specification," said Philip J. Reilly, employment manager of the Dennison Mfg. Co., Framingham, Mass. "In many instances the specification may be supplemented with photographs illustrating the nature of the work. Samples of finished work also may be kept in the employment office so that all applicants for positions may be given a thorough understanding of the nature of the work.

Certificate of Service

"I think we all can take a lesson from the war department's experience in selecting and training men. We now are trying to work out a system whereby we will grant employes who wish to leave the company certificates of service. A soldier is proud of such a certificate and I believe the civilian worker will be proud of it. If an employe wants to leave our shop for larger opportunities elsewhere we think he should be aided in every way. The certificate of service would aid him much better than a letter of recommendation. The certificate we have in mind will present the reason for the person leaving our employment, a statement as to the nature of his work and that it was satisfactory, and, more important than all, the statement that we will give such employe preferential consideration should he desire to return to us."

In discussing Mr. Reilly's paper, H. C. Metcalf, of the Bureau of Industrial Research, New York, said the best asset any employer may have is the wholesome, enthusiastic support of all his employes in improving the quality of his product.

"A great deal has been said about methods of selling a job to an employe; we should stress the idea of offering an opportunity to an employe, and the mutuality of interests and opportunities," he said. "We should attempt to secure to the worker as much as possible freedom in occupational choice, for we never will have genuine co-operation until we have solved that problem. Forced consent in placing a worker does more than anything else to destroy his interest in the work."

W. S. MacArthur, office manager, Armour & Co., Chicago., who was identified with army personnel work with the American force in France, gave a brief outline of some of the features of the employment office work of the Armour company.

"We have made more progress in the past year and a half by studying the army personnel system than we did in a decade before the war, and I believe that is true of employment managers in general. The year is coming when a man applying for a job will present his classification card, under a civilian system of indexing and keeping a record of all employes.

"Are we not devoting too much time and energy to the problems of the men in the shops and neglecting the work pertaining to those in the office? It seems to me that we have overlooked opportunities in this direction."

Boyd Fisher, supervisor of personnel, Aluminum Castings Co., Cleveland, in discussing Mr. MacArthur's talk, suggested that the reason employment managers do not devote more attention to office employes is because the latter are not organized and therefore do not compel it. He advocated more consideration for such employes.

"We are working out a system providing for transfers of men who have particularly hard work to do," said Mr. Fisher. "We intend to write in our job specification the length of time which we will expect a workman to remain on a particular job known to be especially burdensome, after which his application for transfer will be given preference.

"We have found that we can promote a man without changing his job or raising his wages, by giving him to understand that he has attained a new grade or rank as a workman in a particular line and considering him as a key man. I want to see grades of rank established in accordance with the ability of workmen.

Safety Measures for Workers

"Safety in industrial plants is not so much a problem in mechanics or engineering as in education and psychology," said David Van Schaact, president, National Safety council, an organization of manufacturers. "If you will analyze the cause of accidents you will find that not more than 10 per cent arise from defective or improper equipment. If the safety engineer understands the human side of his work he can build up a first-class department. If he is a first-class mechanic, but does not understand men or has no knowledge of human nature he will not get very far. For this reason safety work should be tied as closely as possible to other phases of personnel work."

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

MADE necessary by the decision of the American International Corp., New York, which operates in 14 countries, to group all of its machinery export selling subsidiaries under one head, the Allied Machinery Co. of America has increased its capital to $5,000,000. This contemplates the absorption of the Allied Construction Machinery Corp. by the Allied Machinery Co. of America. The Allied Machinery Co. de France and the Allied Machinery Co. d'Italia will retain their corporate entities but their parent corporation will be the Allied Machinery Co. of America rather than the American International Corp. This also is true of the Horne Co., Ltd., Japan, purchased early this year by the International corporation, which continues to own all shares of the Allied Machinery Co. of America. J. W. Hook will continue as president of the latter company, in general charge of the business. F. A. Monroe, S. T. Henry and T. G. Nee have been elected vice presidents, Mr. Monroe in charge of administrative affairs and Mr. Henry in charge of sales and advertising. Mr. Nee at present is in Japan. R. P. Hedier is general sales manager of the company, with headquarters in Paris.

* * *

BEN J. KLEIN and not M. J. Klein, form the firm of Klein & Wolf, Ravenna, O. They deal in scrap iron, steel and general merchandise.

* * *

THEODORE GEISSMANN & CO., 332 South Michigan boulevard, Chicago, have been appointed sales agents in the Chicago district for the Donner Steel Co., Buffalo.

* * *

ORGANIZED for the purpose of selling and manufacturing kerosene oil burners, the Champion Kerosene-Burner Co., Kenton, O., is managed by R. W. Valls, who is president of the company.

* * *

WITH all equipment contracted for, the Wittenmeier Machinery Co., 216 North Jefferson street, Chicago, will commence to operate its new factory in the near future. The size of the new building is 80 x 75 feet, adjoining the old building, which is 25 x 115 feet.

* * *

BEFORE the month is out, the Manitowoc Plating Works, Manitowoc, Wis., hopes to be occupying its new building. To finance the construction, the company was incorporated at $35,000, with W. J. Wachowitz, president; Stanley Buretta, vice president, and E. A. Butz, secretary.

* * *

IN one month's time recently, the Wheeler Condenser & Engineering Co., Carteret, N. J., manufactured and shipped 879,900 pounds of seamless drawn brass and copper condenser tubes, which is said to be a high record. The company maintains a research department to investigate the problems of the individual user of its products.

* * *

CAPITALIZED at $10,000 the Ohio River Hub Co., New Albany, Ind., will manufacture oak and hickory wagon hubs and rims, etc. J. C. Sieg is president; Milton Bean is vice president, and Ivan R. Eckert is secretary and treasurer. Wood-working machinery is understood to be needed for the plant now under construction.

* * *

THE Pittsburgh Crucible Steel Co. has received a permit from the federal authorities to construct a coal hoist, retaining wall, clusters of guide piles and an addition to the present pumping station on the right bank of the Ohio river about 37 miles below Pittsburgh and about 1000 feet above the abutment of dam No. 7.

* * *

CHARLES HUBBARD & CO., 81 Fulton street, New York, have taken W. H. Peterson into the firm as an active partner with Lyman J. Fisher. They will continue to represent the Reading Iron Co., Reading, Pa., in the sale of iron and steel forgings, and the Sterling Steel Foundry Co., Braddock, Pa., in the sale of acid open-hearth steel castings.

* * *

THE H. T. Shearer Machine Co., Waynesboro, Pa., recently opened up its plant No. 2 at Waynesboro, in which it manufactures bridge and boiler reamers exclusively. Specially designed machinery for the manufacture of these reamers has been installed and the company expects to increase its capacity to 600 reamers per day within the next 60 days.

* * *

TOOLS and equipment for the production of seamless steel gas cylinders used for the transportation of compressed gases, are being installed by Wm. Wharton Jr. & Co., Inc., Easton, Pa., a subsidiary of the Taylor-Wharton Iron & Steel Co., Philadelphia. It expects to commence manufacturing operations by July 1. Headquarters for the sale of gas cylinders will be at 30 Church street, in charge of Charles L. Gulick.

* * *

BIDS will be received by the Transport Truck Co., Mount Pleasant, Mich., until 10 a. m., June 5, on a new 1-story factory building, 160 x 300 feet, saw-tooth roof construction, modern and complete in every way, as well as on a 32 x 40-foot power plant. Full plans and specifications are on file at the Builders' & Traders' exchange at Detroit, Grand Rapids, Flint and Saginaw, Mich., Indianapolis, Chicago, Toledo, O., and Cleveland.

* * *

TO facilitate the handling of its domestic sales in the eastern section and to serve the eastern representatives of its clients, the Minneapolis Steel & Machinery Co., Minneapolis, has expanded and developed its service in the New York office at 154 Nassau street and now is prepared to design and quote on steel structures and mechanical equipment from that point. J. A. Teach, contracting, mechanical and structural engineer, and C. W. Hadden, export manager, are in charge.

* * *

ELECTION of George A. Harder, president of the Essex Foundry Co., to the same office in the Central Foundry Co., New York, is preliminary to consolidation of the two companies, it is stated. The combined companies are to be reorganized into a new corporation to be known as the Iron Products Corp., of which Mr. Harder will be president. The Central company owns coal and iron mines and operates several large foundries. The new company will specialize in the manufacture of trademarked articles.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

DAVID W. DUNLEVY, who has been vice president in charge of manufacture of the Colonial Steel Co., Pittsburgh, has been elected president of that company, taking the place of the late Col. John B. Finley. Mr. Dunlevy enters upon his new duties thoroughly equipped by an experience covering more than 25 years, practically all of which has been in the crucible steel business. He has been with the Colonial Steel Co. since 1908, first as general superintendent and latterly as vice president in charge of manufacture. Prior to making his present affiliation he was with the Crescent Steel Co., now a part of the Crucible Steel Co. of America, serving in various capacities and finally reaching the position of assistant general manager. He also had charge of the construction of the plant of the Braeburn Steel Co., Braeburn, Pa. Mr. Dunlevy was born and has lived all his life in Pittsburgh and is a Western University of Pennsylvania, now the University of Pittsburgh, graduate.

F. Stiehl, Melinas, N. Y., has been made superintendent of the Vermillion Malleable Iron Co., Hoopeston, Ill.

Andrew Telfer recently was appointed manager of the Continental works of the National Tube Co., Pittsburgh.

George DuFour recently was made core-room foreman for the Nash Motor Co., Kenosha, Wis.

Herbert Fleck has been appointed chief chemist for the Crucible Steel Co., Pittsburgh, to succeed his brother, E. M. Fleck.

H. M. L. Hunter has become connected with the sales force of the Jones & Laughlin Steel Co., Pittsburgh, and will travel from its Cincinnati office.

H. M. St. John has been made assistant manager for the Detroit Electric Furnace Co., Detroit, having resigned as research engineer for the Commonwealth Edison Co., Chicago.

Albert J. Tanck has been placed upon the steel force of the National Steel Co., 1944 Conway building, 111 West Washington street, Chicago, to represent it in Wisconsin.

Harry G. Bow of Canton, O., who for about 30 years has been connected with the manufacturing and selling of pressed steel specialties, has been appointed president and general manager of the Wheeling Ceiling & Roofing Co., Wheeling, W. Va. Otto Hess is secretary and general superintendent and N. S. Goudy is sales and advertising manager.

F. A. Bean has been placed in charge of the new consulting and advisory

GEORGE W. NIEDRINGHAUS

Who recently was elected President of the National Enameling & Stamping Co., New York, St. Louis and elsewhere, as noted in the May 8 issue of THE IRON TRADE REVIEW

service for oil men, inaugurated by the Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.

Capt. W. Harry Brown, Pittsburgh, will known coal and coke operator, is reported to be making progress in recovering from a major operation, which he underwent recently.

Alexander McCarty, formerly with the New Jersey Art Metal Mfg. Co., Newark, N. J., has been made superintendent of the E. & T. Fairbanks Co., St. Johnsburg, Vt.

S. Griswold Flagg III, who was a charter member of the American Foundrymen's association, has been elected a director to succeed H. E. Diller, who resigned recently.

Capt. J. A. McIntosh has returned to his former position in the engineering department of the Ohio Brass Co., Mansfield, O., after service overseas with the tank corps.

W. J. Kehoe, head of the Kehoe Iron Works, Savannah, Ga., recently was elected first vice president of the Savannah chapter of the American Association of Engineers.

Theodore H. Sterling, New York, has been elected secretary and treasurer of the Standard Screw Co. operating plants in Hartford, Conn., Worcester, Mass., and several other cities, to succeed Solon C. Kelley, resigned.

E. A. MacDonald has resigned as assistant secretary of the Savage Arms Corp. and has become secretary and treasurer of the recently organized Standard Tank Car Co., Sharon, Pa.

Harry F. Coyle has been made production superintendent of the Central Steel Co., Massillon, O. He formerly was with the Cromwell Steel Co., Lorain, O., and before that with the Illinois Steel Co., Gary, Ind.

L. S. Thomson recently became connected with the structural sales division of the Midvale Steel & Ordnance Co., Philadelphia. For five years he had been affiliated with the La Belle Iron Works, Steubenville, O.

Lon R. Smith has resigned his position as sales manager of the Buda Co., Harvey, Ill., and has become general sales and advertising manager of the Midwest Engine Co., of Indianapolis.

Waldo S. Reed recently was elected vice president of the Emergency Fleet corporation, but will continue his duties as treasurer. Mr. Reed formerly was engaged in the banking business in New York.

Prof. William H. Dosey, head instructor at the foundry of Carnegie Institute of Technology, Pittsburgh, has been appointed assistant in the training method section of the training service of the federal department of labor.

F. de St. Phalle, recently elected vice president of the Baldwin Locomotive Works, Philadelphia, has been placed in charge of a separate department inaugurated to handle the company's foreign sales. Reeves K. Johnson is manager of foreign sales.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

VERYL PRESTON resigned recently as president of the Eastern Steel Co., Pottstown, Pa., to devote his attention to personal affairs. Mr. Preston became head of the Eastern Steel Co. at its organization in 1902 when it acquired the Pottsville Rolling Mills, Pottsville, Pa. The original plant was practically dismantled and rebuilt for the production of structural shapes. Prior to that time he was identified with the American Sheet Steel Co., which later became the American Sheet & Tin Plate Co.

Blaine H. Miller has resigned as city commissioner of buildings for Indianapolis to become manager of the American Foundry Co., that city.

Roy W. Wallace recently sold his interests in the Wallace Machine & Foundry Co., Lafayette, Ind., to devote his entire time to his automobile business.

Capt. A. H. Jessup has been discharged after a year's service in France with the sanitary corps, second army headquarters and has resumed his duties as plant engineer with the Lakeside Forge Co., Erie, Pa. He returned home with the Seventy-seventh division.

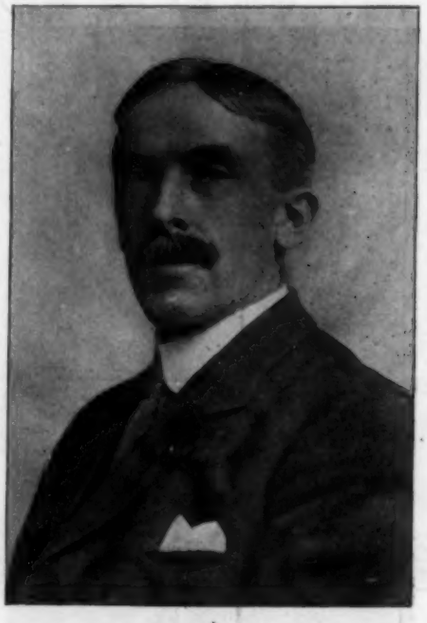
J. A. Disney now represents the Atlas Crucible Steel Co., Dunkirk, N. Y., in southern Ohio territory, operating from 624 Lindsey building, Dayton, O. He formerly was district manager of the company's Canadian branch at Montreal and Quebec.

H. Harrison Kress, formerly in the main office of the Hauck Mfg. Co., Brooklyn, has been placed in charge as district manager in Philadelphia for the Hauck burner service station which recently was removed from 1711 Sansom street, and will occupy an entire building at 1718 Sansom street.

L. A. Danse, formerly in charge of the heat-treating department of the Lincoln Motor Co., Detroit, resigned recently to accept a position in the plant extension department of the General Motors Corp., Detroit. H. M. Bray, formerly in charge of tool-hardening, succeeds Mr. Danse.

Charles T. Fallon has been appointed Boston district sales manager of the Tacony Steel Co. with newly opened offices in the Olivery building, that city. Mr. Fallon who was previously connected with Wheelock, Lovejoy & Co., has been in the United States naval reserve flying corps since 1917.

William De Krafft has been elected vice president in charge of finances of the Baldwin Locomotive Works, Philadelphia. Mr. De Krafft also is treasurer of the company. Arthur L. Church has been elected secretary and assistant treasurer of the Baldwin Locomotive Works.



A. E. BARLOW,
President of the Barlow Foundry Co., Newark, N. J., who recently was re-elected President of the Newark Foundrymen's Association for the third time

James W. Prenter, who has served the Pittsburgh Screw & Bolt Co., Pittsburgh, as eastern sales manager with headquarters in the Land Title building, Philadelphia, has had the New York territory added to his district. He will maintain his offices in Philadelphia.

J. E. Fogarty, formerly of the Electric Steel Co. of Indiana, Indianapolis, is president, and George Fohl, formerly of the Hill Pump Co., Anderson, Ind., is treasurer, of the Keystone Foundry Co., Plymouth, Ind., recently incorporated to manufacture gray iron, brass and aluminum castings. The company is building a plant.

Max Meltzer recently resigned from the New York office of E. B. Leaf & Co., Philadelphia, scrap dealers. He has been made Philadelphia and New England district manager for the Erie Iron & Steel Co., Erie, Pa. At one time he was affiliated with Joseph Joseph & Bros. Co., New York.

Charles H. Elliott resigned recently as assistant superintendent of the blast furnace and steel plant of the Youngstown Sheet & Tube Co., Youngstown, O., after a service of about seven years. He has become affiliated with the Weirton Steel Co., Weirton, W. Va.

Capt. A. H. Robertson Jr., formerly chief engineer of the Dover Boiler Works, Dover, N. J., who recently received his honorable discharge from service, has been appointed general manager of the Oregonia Bridge Co., Inc., Lebanon, O., to succeed Thomas R. Spencer, who resigned recently after a 30-year affiliation.

George H. Hunt, recently was made wheel division sales manager for the Detroit Pressed Steel Co., Detroit. For the past year, he has been Detroit representative for the Edward G. Budd Mfg. Co., Philadelphia, and the Budd Wheel Corp., prior to which time, he was manager for the Stromberg Carburetor Co., for several years.

Marcus L. Filley resigned recently as New York sales manager for the Deforest Sheet & Tin Plate Co., Niles, O., after a service of 10 years. He has been made eastern sales manager of the Mahoning Valley Steel Co., Niles, and will occupy his present offices at 30 Church street, New York City, until further notice.

James F. McClelland, professor of mining and metallurgy of the Sheffield school of Yale university and director of engineering research of the Hammond laboratory, has joined the staff of the industrial department of the Liberty National bank, New York, as consulting engineer for the bank and the Liberty Securities Corp.

C. H. Nold has been appointed district sales manager for the Harbison-Walker Refractories Co., Pittsburgh, with offices at 411 Morris building, Philadelphia. He succeeds J. E. Morgan, resigned. J. T. King, who has been connected with the Philadelphia office of the company for some time, will continue in that capacity.

Men of the Machinery Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

LIEUT. COL. A. W. ERDMAN has been appointed general manager of the small tools department of the Pratt & Whitney Co., Hartford, Conn. Mr. Erdman was commissioned major in the inspection division of ordnance in June, 1917, and was promoted to the rank of lieutenant colonel in January, 1918, which rank he held until he was honorably discharged in December, 1918. He was graduated from Stevens Institute of Technology with the degree of mechanical engineer and served the Randolph Clowes Co., Waterbury, Conn., as superintendent of mechanical engineering from 1901 to 1909. Two years of personal research and experimental work followed, during which he developed a compensating device on the Lewis range finder, of which the government used over 300 for coast artillery defense purposes. From 1911 to 1917, Mr. Erdman was assistant mechanical superintendent with the General Electric Co., for the last two years having general supervision of the manufacture of ordnance material in that company's plants.

H. I. Miner has been appointed sales manager for the Cleveland Milling Machine Co., 18511-17 Euclid avenue, Cleveland.

A. J. Bright has been placed in charge of the new branch office at 1164 Monadnock block, Chicago, established by the Thew Automatic Shovel Co., Lorain, O.

E. C. Ryan, formerly of the New York office of the Electric Controller & Mfg. Co., has been made manager of the Chicago branch, with headquarters in the Monadnock building.

E. K. Thomas has been made superintendent of the Hunter Saw & Machine Co., Pittsburgh. Formerly he was with the M. M. Granton Chemical Co., New Brunswick, N. J.

Capt. Ben Sloan, recently discharged from service in the ordnance department, has resumed his work in the sales department of the Pratt & Whitney Co., Hartford, Conn.

W. R. Hendrey has been placed in charge of the new Seattle office in the Hoge building of the McMyler Interstate Co., Bedford, O., manufacturer of locomotive cranes, car dumpers, etc.

Langdon S. Simons, recently discharged as a captain in the United States army, has been made manager of the Boston office at 10 High street, of the Reliance Electric & Engineering Co., Cleveland.

J. F. Mackay, recently treasurer of the Russell Motor Car Co., of Toronto, Ont., has been appointed secretary and treasurer of the Willys-Overland, Ltd., which is closely affiliated with the Russell Co.

William L. DeBaufre resigned recently from the naval engineering experiment station, Annapolis, Md., and has become designing engineer with the Precision Instrument Co., Detroit.

A. C. Lindholm now is general manager for the Franklin Machine & Tool Co., Springfield, Mass., having resigned as mechanical engineer with the Colts Patent Fire Arms Mfg. Co., Hartford, Conn.

William G. Hepburn, formerly superintendent of maintenance of the United States arsenal at Watertown, Mass., has joined the sales force of the Niles-Bement-Pond Co. at its Pittsburgh office.

E. H. Anthony has been made western sales manager for the Gale-Sawyer Co., Boston. He formerly was with the Brown & Sharpe Mfg. Co., Providence, R. I., and the Bilton Machine Tool Co., Bridgeport, Conn.

F. H. Brown, formerly general sales manager of the Davis Machine Tool Co., Rochester, N. Y., recently became general manager of the O. R. Adams Mfg. Co., Rochester, N. Y., manufacturers of lathes.

N. B. Stewart has been appointed district representative in charge of St. Louis territory for the American Steam Conveyor Corp., Chicago. Offices have been established at 708 Merchants-LeClede building, St. Louis.

Roland B. Page has been made eastern district sales manager, with headquarters at 610 Broad Exchange building, Broad and Franklin streets, Boston, of the Lea-Courtenay Co., New York, manufacturer of centrifugal pumping machinery.

Henry Brewer has been placed in charge of a pyrometer sales and service department established at 1304 Monadnock block, Chicago, by the Leeds & Northrup Co., Philadelphia, manufacturers of electrical temperature measuring instruments.

A. H. Bauman, formerly general foreman of the gun department of the American Brake Shoe & Foundry Co., Erie, Pa., now is affiliated with the sales department of the Cleveland-Duplex Machinery Co., Cleveland. He will assist in handling the Cleveland territory.

Dudley H. Cohen has sold his interest in the William Brewster Co. and resigned as vice president to devote all his time to the business of the Trojan Tool Corp., 511 West Forty-second street, New York, of which he recently was elected treasurer and general manager in charge of production and sales.

Charles Wheeler resigned recently as superintendent of the Spartan Machine Co., Montreal, Que., to take a trip to Australia. Prior to becoming associated with the Spartan Co., Mr. Wheeler was general superintendent of the St. Lawrence Machinery Co.

J. A. Teach, contracting, mechanical and structural engineer for the Minneapolis Steel & Machinery Co., Minneapolis, now is making his headquarters in the company's New York office, 154 Nassau street. C. W. Hadden continues his duties as export manager.

J. A. Taggart resigned recently from the Advance Machinery Co., Van Wert, O., after a 20-year affiliation. He now is associated with A. L. Fader at 547 Washington boulevard, Chicago, as Fader & Taggert, direct factory representatives, handling wood-working machinery.

E. T. Causer resigned recently as works manager for the R. D. Nuttall Co., Pittsburgh, and has announced no plans for the future. He has been connected with the company for over three years, prior to which he was affiliated with the Mitchell Motor Co., Racine, Wis., and with the Driggs-Seabury Ordnance Corp., Sharon, Pa.

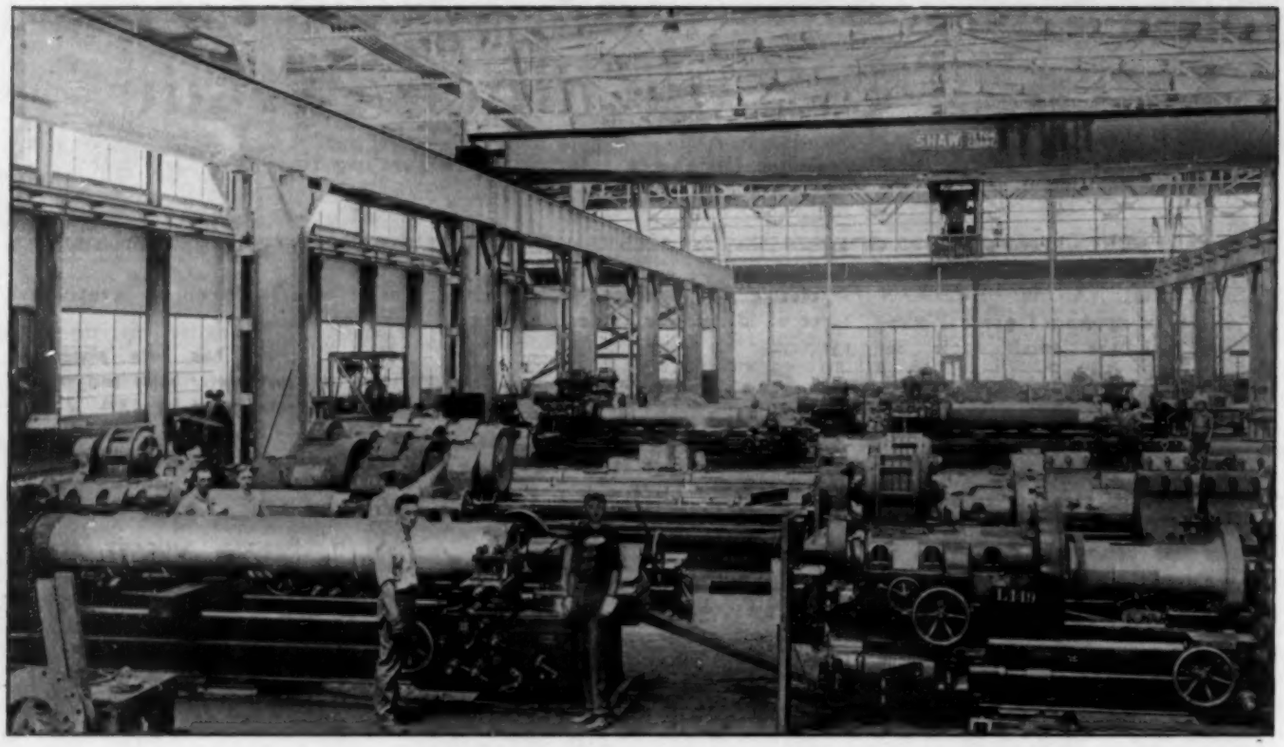


Fig. 1—New Machine Shop Which Serves the Forge Department of the Gary Plant of the American Bridge Co.

Modern Forge Shop for Ordnance

New Gary Shop of American Bridge Co. With Complete Forging, Rough Machining and Heat Treating Departments Erected and Placed in Operation in Period of Only Six Months

BY C. J. WALKER

THE first forgings made by the American Bridge Co. were produced at the Chicago plant in 1871. From time to time since that date, plant enlargements have been made, the most important being necessitated by the entrance of the nation into the world war. The Gary plant was called upon to produce rough-machined and heat-treated forgings for 155-millimeter guns, 8-inch railway guns and 240-millimeter howitzers. This necessitated the erection of a forge shop, machine shop, heat-treating and annealing shops, chemical and physical laboratories.

The work of erecting the ordnance plant commenced early in December, 1917. On Feb. 1, 1918, less than three months later, the forge building was practically completed, although the work had been handicapped by the exceedingly severe winter weather. In April, 1918, the steel work on all buildings was about 80 per cent completed and fires were burning in some of the heating furnaces in the forge shop. At the end of July, eight months after work was started, all buildings and foundations were practically completed.

The forge heating equipment, which is arranged along the west wall of the shop, consists of fifteen 2-door coal-fired furnaces, capable of taking ingots up to 78 inches in diameter. The coal for the furnaces is conveyed to the hoppers by a conveyor, made by the Robins Conveying Belt Co., New York, and is fed to the furnaces by means of underfeed stokers made by the American Stoker Co., New York. Waste gas from each furnace passes through waste heat boilers made by the Wickes Boiler Co., Saginaw, Mich., which generate steam for the presses.

The steam hydraulic press equipment consists of one 1000-ton, two 2000-ton and one 3000-ton presses built by the United Engineering & Foundry Co., Pittsburgh. These presses are arranged along the east wall of the shop, as shown in Fig. 2. Each press is served by a single leg electrically-operated gantry equipped with electric turning gear. Three electric cranes of 80-foot span operate above the gantries. The maximum weight of forging which may be handled is 75 tons.

Gun forgings were made from electric nickel steel obtained from the South Chicago works of the Illinois Steel Co. The smaller forgings were made from blooms, while the larger ones were made from ingots which were received hot from the mill. Ingots were kept hot while being transported by means of special sand and asbestos lined cars. Upon arrival at the forge plant, the ingots were immediately charged into the heating furnaces.

The initial forging operation was performed in the new plant on the 1000-ton press on April 24, 1918. The first gun forging, consisting of a tube for a 155-millimeter gun, was made on May 6. The first of the 2000-

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A paper presented at the fifteenth general meeting of the American Iron and Steel Institute, New York, Friday, May 23. The author, C. J. Walker, is manager, forge plant, American Bridge Co., Gary, Ind.

ton presses was placed in service May 15, 1918.

The machine tool equipment of the three machine shops consists of 33 turning lathes, 38 boring lathes, 18 planers, 2 slotters, 8 horizontal core drills, 5 test-bar grinders, two 62-inch and one 90-inch cold saws, and miscellaneous tool room equipment. The initial machine operation on a gun tube after centering, is turning. The forging is turned to about ½-inch above finishing size and is then placed in the boring lathes where the boring is completed. The boring operation was performed by female operators in a very satisfactory manner. The outer surface of the jackets for the 240-millimeter howitzer and the 155-millimeter gun is made up of curved and planed portions on the same transverse section, and in order to plane these pieces they were mounted between rotating centers on bed planers.

The heat-treating building is served by one 15-ton crane, 40 feet from the floor, and one 50-ton crane, 75 feet from the floor. The heat-treating equipment consists of four vertical down-draft oil-fired furnaces, varying in depth from 26 to 45 feet, and in diameter from 7 feet 10 inches to 9 feet 10 inches, with two quenching tanks, one 26 feet deep by 19 feet in diameter and one 45 feet deep by 16 feet in diameter. The first gun forgings were heat treated June 29, 1918. The annealing and drawing operations were performed in twelve 30-foot oil-fire car bottom furnaces, eight of which may be readily converted to four 60-foot furnaces. All furnaces were supplied with a complete equipment of recording and indicating pyrometers.

Cutting of Test Bars

The cutting of test bars from the treated material was done with special tools and equipment, designed and built at the Gary plant, which made possible an average feeding rate of ½-inch per minute. The special feature of this equipment was a small six-lipped high-speed steel cutter attached to a hollow boring bar. High pressure air admitted to the interior of the hollow bar completely removed all chips, thereby preventing the breakage of cutters and making possible the use of a rapid feed.

Another tool of considerable interest developed at this plant, is a live-center boring head with which it was possible to remove 700 pounds of chips per hour from a 9-inch diameter hole. The critical part of a typical boring head is the point of the cutter. This point instead of cutting the metal, actually removes same by scraping. With live-center head, the metal at the point is removed by a 3-inch drill running at the proper speed. The factor, therefore, which determines the feed to be used in drilling large diameter holes depends largely upon the removal of the metal at the center. With the live-center drill it is customary to increase the number of cutters in the head, thereby maintaining the work done per cutter at about the same value as with the ordinary head.

After acceptance of test, the test-metal portion on each end of the forging is removed by cold sawing and the piece is ready for shipment to the finishing plant.

Since the completion of the ordnance program, it has been found that the new plant is properly arranged for the manufacture of various types of hollow and solid forgings rought and finished machined.

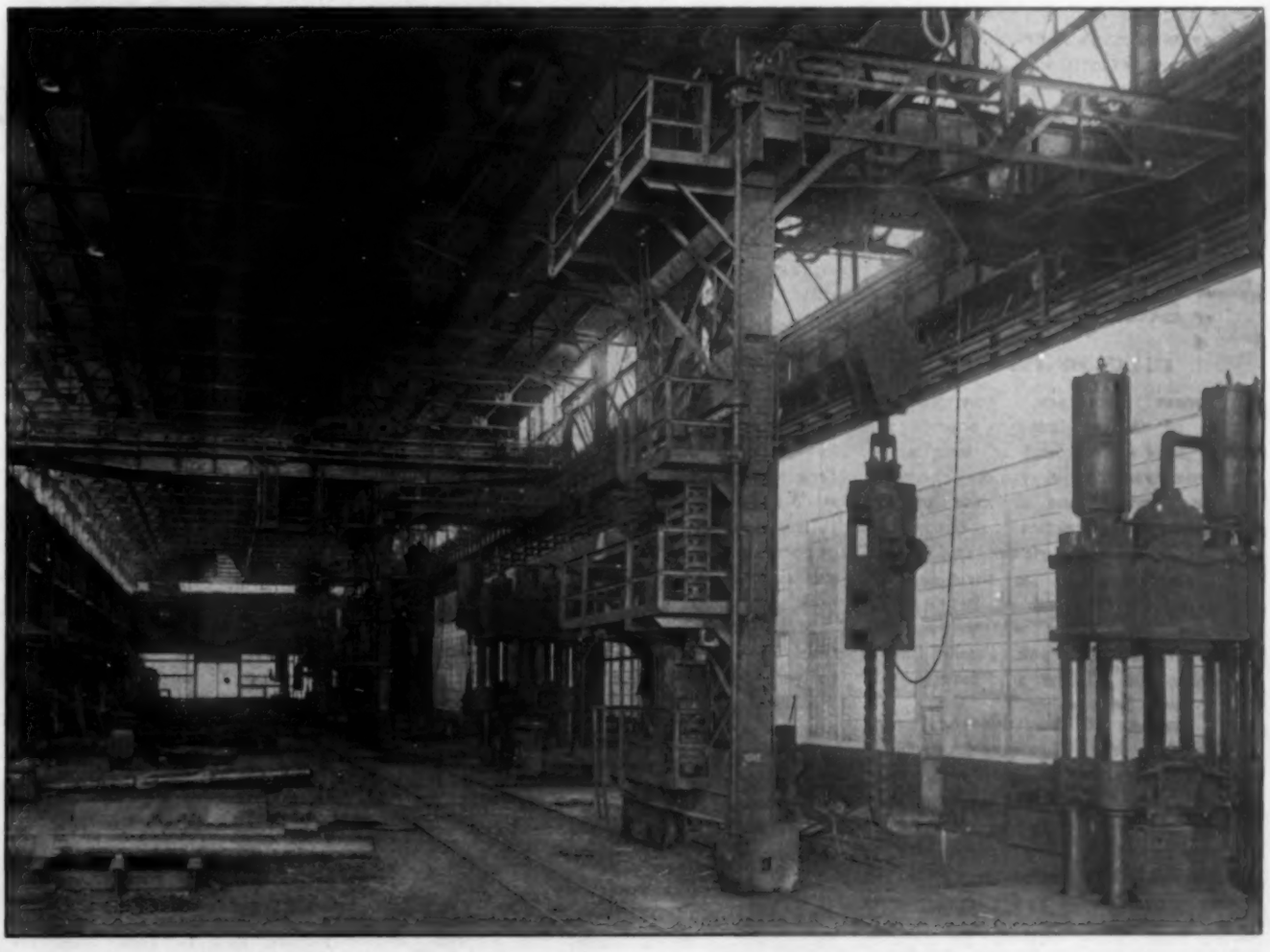

FIG. 2—VIEW OF NEW FORGE SHOP SHOWING THE ARRANGEMENT OF THE PRESSES AND CRANES

Finish Bulk of Contract Adjustments

Seventy-five Per Cent of Work is Done, Assistant Secretary of War Reports— 15,756 of the 24,199 Contracts Which Were Curtailed Finally Settled —$153,476,000 Awarded, $125,000,000 Paid

WASHINGTON, May 28.—Of the 24,199 contracts, formal and informal, performance of which has been curtailed by the war department since the armistice, 15,756 have been disposed of finally by release, supplementary agreement or award, according to a report made to Secretary of War Baker by Assistant Secretary Crowell, announced today. The report deals with the settlement of supply contracts in the United States and Canada.

Contractors and district boards also have reached a definite agreement as to approximately 2500 contracts. Substantially all of the others have been formally or informally taken up by the claims board and are in process of examination and verification, many of them being in an advanced stage of negotiation. Of these, however, claims which it is estimated will amount to $150,000,000 have not yet been formally presented by the claimants owing to their extent and complexity.

In addition to the 24,000 formal and informal contracts reviewed, under which performance has been curtailed, there will be some additional claims under the act of March 2, 1919, known as the war contract bill, on agreements expressed and implied. As these claims may be presented up to June 30, 1919, their number cannot now be accurately estimated.

$153,476,000 *Awarded*

Assistant Secretary Crowell says certain of the settlement boards are rapidly nearing the end of their work. The construction division, chemical warfare service, and director of explosives have practically completed their work. The engineer and signal corps should complete their settlements before the end of June. The ordnance department which has had by far the heaviest task, should "have put behind it all but a difficult residue before September."

It is estimated that the total cost to complete the eliminated portions of the contracts up for settlement will be $3,600,000,000. The estimated amount claimed or to be claimed in the settlement of this elimination is $700,000,000, the claims being based on the expenditures and commitments of prime contractors and not including any prospective profits for them.

Up to this time $153,476,000 has been finally awarded, of which approximately $125,000,000 has been paid. Up to May 17, 568 awards were made under the act of March 2, the total amount to be paid under the same amounting to $38,081,623, of which $33,596,168 was paid to the claimants. The uncompleted portion of the original agreements on which these awards were made amounted to $201,-231,479. The foregoing awards are included in the general figures relative to the adjustment of formal and informal contracts, performance under which has been curtailed. The total number of claims filed under the act of March 2, at this time, is 2844.

75 *Per Cent of Work Done*

Mr. Crowell points out that in considering the amounts paid in settlements which have already been approved, and also those which it is estimated will have to be paid on account of contracts under which performance has been curtailed, it must be remembered that in the course of these settlements the department is taking over considerable quantities of material and equipment and various plants. The value to the government of this material and equipment can only be determined as the result of salvage operations, but it is undoubtedly substantial.

The work of contract adjustment, says Mr. Crowell, has been and is being carried on by organizations essentially civilian in character. Business men of standing, he explains, have remained in the service as officers or civilians to carry on this work in Washington and in the various localities where settlements are being negotiated. They have developed organizations adequate to handle the task.

Mr. Crowell believes that more than 75 per cent of the actual work to be done has been completed. He speaks highly of the spirit of co-operation and fair dealing evinced by the contractors. The 24,000 contracts, if completed, would have involved a total expenditure of approximately $6,-000,000,000. Dealing with the basis of settlement, the report says:

How Contracts are Being Adjusted

"As to many contracts where performance was curtailed, the adjustment of the contract was effected by an agreement as to the extent of the curtailment, the contractor accepting a reduced order in lieu of the original one and payments in addition to those for completed articles being only nominal. Ordinarily, however, the contractor has properly made expenditures or commitments with reference to that portion of his contract which is not to be completed, which require the application of a basis of settlement. As to such situations, the basis adopted has provided for the reimbursement of the contractor for his expenditures and protection on his commitments, and in addition, a fair remuneration for the use of his capital and services which did not result in completed articles. In detail this standard basis of settlement is as follows:

"1. Reimbursement to the contractor for raw materials, direct and indirect, and component parts on hand in an amount not exceeding the requirements for the completion of the contract: Cost plus inward handling charges plus such portion of overhead as is directly applicable, less such sums as may represent the fair agreed value of all or any portion thereof, if the title and possession of the same are retained by the contractor.

"2. Reimbursement to the contractor for articles in process, in an amount not exceeding the requirements for the completion of the contract: Cost of raw material and labor plus such portion of overhead as is directly applicable, less such sums as may represent the fair agreed value of all or any portion thereof, if the title and possession of the same are retained by the contractor.

"3. Payment to the contractor of a fair and equitable remuneration (1) for expenses and services of the contractor in connection with the items included in paragraph 1, but not to exceed interest at 6 per cent per annum on the capital invested therein, or, if the capital was borrowed, interest at the rate paid by the contractor; and (2) for expenses and services of the contractor in connection with the items included in paragraph 2, but not to exceed 10 per cent of the cost thereof.

"4. Reimbursement of the contractor for such amounts as are properly paid by him in the adjustment and termination of unperformed subcontracts and unperformed commitments for supplies which were properly entered into or made in connection with the performance of said original contract.

"5. Reimbursement to the contractor for payrolls and expenses paid or incurred with the approval of the contracting officer, or properly paid or incurred without such approval, for the custody and protection of property since the date of suspension above recited and pending final settlement.

"6. Reimbursement to the contrac-

tor where special facilities were properly provided in connection with the performance of the original contract, necessity of which was contemplated by the contractor and included in his estimate of cost at the time the original contract was made, of such portion of the cost thereof as would reasonably have been recouped had the uncompleted portion of the original contract been performed.

"7. Payment to the contractor of such additional sums, if any, as the secretary of war may deem necessary fairly and justly to compensate to the contractor for expenditures, obligations and liabilities necessarily incurred, including work, labor and service necessarily rendered, under the original contract or in preparation for the performance thereof, or under this supplemental agreement.

"It is to be noted of this basis of settlement that in addition to reimbursement it provides some remuneration to the contractor for what he has actually done under the contract, but no profit for that work which he might have done if the contract had gone to completion. Ordinarily the formula laid down is applied, but that formula itself contemplates exceptional cases in which special circumstances may in justice require other or additional compensation."

Measure Seeks 8-Hour Day

WASHINGTON, May 26.—Introduced in the senate May 23 by Senator Moses, Republican, of New Hampshire, was a bill providing for an 8-hour day to be effective Jan. 1, 1921, for industries engaged in interstate commerce, including mines, quarries, mills canneries, workshops, factories or manufacturing establishments. The bill provides that the 8-hour day shall be made effective beginning Jan. 1, 1921, and any violation of the proposed law would be punishable by a minimum fine of $100 and a maximum fine of $1000 or imprisonment not to exceed one year, or both.

The measure is in the form of the Adamson law of September, 1916, which was the 8-hour day for railroads and, Senator Moses said, has successfully withstood the scrutiny of the courts upon the constitutional attack.

In speaking of the bill, Senator Moses said it had been generally held that legislation of this character properly belongs to the states and that congress had no right to intervene. It was pointed out that the President in his latest message to congress gave an intimation of this character when he declared that congress had already started to regulate the hours of labor in all industries with which it had any right to act.

"It seems to me," Senator Moses said, "that the President's intimation is that of a narrow constructionist; and it is probable that constitutional objections will be raised by my bill along these lines. I hope, however, that the constitution will not be invoked as a cloak to any selfish purpose to retain long hours of labor for states where legal legislation permits it to the detriment of the states where more advanced legislation has been enacted. In any event, I hope that the discussion of the bill both in the committee and on the floor may follow the lines of the arguments deduced in behalf of the Adamson law, and that in the event of congressional success with the measure the courts may adhere to the doctrine which the Adamson law case developed."

War Expenditures Huge

Washington, May 27.—The total war cost to the United States up to April 30, 1919, as shown by treasury department reports of disbursements for all government bureaus during the war period, amounted to $21,294,000,000, exclusive of loans to the allies. This immense total of war expenditures represents the money outlay during the war period in excess of what the the government expenses would have been under peace conditions. Expenditures during the years 1912-1916, inclusive, have been used to estimate the outlay of peace times.

Disbursements made from April 6, 1917, to June 30, 1918, by the treasury department totaled $10,051,000,000 and from July 1, 1918, to April 30, 1919, amounted to $13,312,000,000, making a grand total of $23,363,000,000. From this figure $2,069,000,000, the estimated expenses under peace conditions, was subtracted, leaving the total war cost up to April 30, 1919, at $21,294,000,000.

War department expenditures made up practically the entire war disbursement, confiscating about two-thirds of the total. From April 6, 1917, to April 30, 1919, a total expenditure of $14,000,000,000 was reached by the war department, the figure being practically two-thirds of the entire war cost as estimated.

Expenditures of the war department will continue to be heavy for some time. It is announced that a few items of ordnance are still being delivered and out of a list of 271 major items, 231 show no acceptances for the week ended May 1. Adjustment of suspended contracts is progressing slowly, although cancellation negotiations involving $446,315,700 have been completed, showing an increase of $26,574,100 for the period from May 3 to May 10. Suspensions accepted by contractors, but where negotiations are not completed, involve a total of $1,731,517,700, or a decrease of $12,879,800.

Buyers Reluctant

To Place Orders for Ammonia Sulphate—Motor Benzol Scarce

New York, May 26.—The fertilizer industry still holds off in covering on fall requirements of sulphate of ammonia and some interests believe this buying may be still delayed. Domestic buying is exceedingly quiet and the market is nominal. There is some foreign trading, prices ranging from $4.85 to $4.90 on material in double bags at the seaboard.

Activity in the eastern coal tar products market continues to be centered around motor benzol, which is scarce. As soon as buyers start specifying against second half requirements it is believed prices will go up. Pure benzol is being bought in fair volume at 22 to 27 cents for spot and contract deliveries. Demand for toluol and solvent naphtha is dull. Prices are unchanged, the market on toluol being around 25 to 35 cents, and on solvent naphtha, 20 to 25 cents.

The drug trade continues to be the most active factor in the naphthalin market, placing fairly good orders. The market on naphthalin is steadily at 8½ to 9½ cents, in flakes, and 10½ to 11½ cents, in balls. Phenol is moving slowly, with the market somewhere under 15 cents.

Coke Oven By-Products

Spot

Per Gallon at Producers' Plant

Pure benzol	$0.22 to .27
Toluol	.25 to .35
Solvent naphtha	.20 to .25

Per Gallon at Producers' Plants

Phenol	No market
Naphthalin, flake	$0.08½ to .09½
Naphthalin, balls	.10½ to .11½

Per 100 Pounds at Producers' Plants

Sulphate of ammonia	nominal

Contract

Pure benzol	$0.22 to .27
Toluol	.25 to .35
Solvent naphtha	.20 to .25

Per Pound at Producers' Plant

Phenol	No market
Naphthalin, flake	$0.08½ to .09½
Naphthalin, balls	.10½ to .11½

Per 100 Pounds Producers' Plants

Sulphate of ammonia	nominal

Foreign Trade Factor in Prosperity

Enormous Total of April Emphasizes Importance of Exports in Providing Stimulus for Business Activity—Question of Maintaining This Trade Revolves on Credit and Exchange—General Financial News

By JOHN W. HILL, FINANCIAL EDITOR

IT is remarkable," truly commented President E. H. Gary, of the American Iron and Steel institute, "how many evidences of business activity there are in this country."

Perhaps none of these is more striking than the enormous record of exports the curve of which instead of declining month by month, as had been anticipated, has been pursuing an upward course. The total for April utterly smashed all previous records with outward shipments valued at $714,500,000, topping the former high level attained in January by $92,000,000.

Comparing the April record with the prewar figures even more exceptional contrasts are presented. The surplus of shipments over imports, $441,000,000, during that month was but little short of the favorable balance of the entire year of 1914 while the average balance in the country's favor for the ten years before the war was slightly below that for the single month of April, 1919.

This can mean nothing but a tremendous turnover and the springing of immense new wealth into negotiable form. It is true that a large proportion of the total represents wheat and other foodstuffs but the credit created, nevertheless, is proving a powerful stimulus to all kinds and degrees of business. It is estimated that 49,000,000 bushels of wheat were sent abroad in April against 13,000,000 for the corresponding month one year ago.

Many close financial and industrial observers maintain that the country's foreign trade at present is one of the fundamental reasons of the country's gaining prosperity. If that is true it is well for business men to watch carefully the foreign trade indicator in laying plans for the future.

Many factors of uncertainty enter into the calculation, however. Announcement that the government is to discontinue its "relief" shipments with the coming of the European harvest may have an appreciable effect upon foreign trade totals in the next few months.

Such undoubtedly will be the result unless Europeans divert an equal amount of the money and credit they have been spending for food to the purchase of materials and manufactures. At this point a factor of very great importance looms. It is that of foreign exchange, which last week was wholly demoralized, with francs at a discount in New York of 20 per cent, Italian lira of 37½ per cent and sterling of 4½ per cent.

This means that French, Italian and English purchases suffer when buying in America. A Frenchman, for instance, must pay $1.20 for every dollar's worth of goods he buys. An American, however, through the process of the exchanges would have to pay but 80 cents on the dollar for goods purchased in France.

This is a situation not calculated to encourage huge buying operations from abroad. In respect to food the case was urgent and there could be no quibbling over prices nor terms. But will not Europeans exercise much greater discrimination and restraint when their food wants are met and they turn their attention to other purchases? In normal times the exchange situation would tend to right itself, because with such encouragement for Americans to buy abroad and such a barrier upon purchases here by Europeans, American exports would fall off and imports greatly increase, until the situation would be balanced. But the present are not normal times, and France and the other countries are not in a position to pay off their debts to us by sending goods here because the goods are not available.

Leading steel men home from investigations of the markets abroad say that buying probably will not be done on an extensive scale, because of the high prices here, aggravated by the exchange rates; and because of the desire of our allies to provide the material for reconstruction out of their own supplies, and keep the purchasing power within their own borders. A great international banker points out that Europe's problem of rebuilding is more one of labor than of material. Notwithstanding, Europe badly needs great quantities of iron and steel products, and it would seem that France is coming to this view also, revising her former attitude of excluding imports. Last week brought the announcement from Washington that French restrictions on imports of reconstruction materials likely will be lifted.

With France in need of goods, with her government ready to admit them, and with these goods available in America, the missing link—of making it possible for her to obtain them—remains to be forged. This, bankers are doing with plans to stabilize exchange, to sell foreign securities in America and to extend credits to foreign buyers. These plans, of course, are influenced by the economic features of the treaty. By these terms the burden under which France is staggering will be shifted somewhat to the Germans, which may be reflected in a recovery in the French exchange rates. Bankers realize that all the nations in Europe will need financial aid and as a result there must be allocation where it will be the most beneficial.

As a means of stabilizing exchange the $1,000,000,000 national trust society plan which will be presented to congress for consideration soon is looked upon as providing a solution. Its purpose is to create a revolving fund and allow Americans to establish fair markets in countries where the dollar is now at a premium.

The belief that the financing task before the country was too great for private interests is borne out in the formulation of this plan, which provides for control by the government. The investment trust's debentures would be issued against long term notes of foreign governments and banks which would establish dollar credits here and who, in turn would be able to extend them to their citizens when it is desired to buy American goods. A bill embodying the plan will go before congress, possibly this week. Fifty per cent of the debentures would be owned by the government and the remaining 50 per cent would be sold to manufacturers, exporters and national banks. This plan together with numerous private projects with similar objects may be sufficient to meet the situation and serve to maintain exports.

Experts Study Taxes

The internal revenue bureau has dispatched 35 specially trained business

agents of the internal revenue bureau to all parts of the company to study commercial and industrial practices in certain lines of business, with a view of advising on future regulations. These men, chosen from a large group of accountants and business men after special examinations, will be expected to ascertain practices in regard to amortization, depletion, depreciation and valuation of assets of the prewar period, and to formulate some sort of guiding rules concerning what constitutes "reasonable salaries" allowed as business expenses to corporations.

Steel Companies Postpone Stock Dividends

The announcement that the Supreme Court has restored to the docket for further argument the McComber case involving the taxability of stock dividends, means delay of any possible decision in the matter until after the time for filing income tax decisions this year. The supertax will thus have to be paid upon all stock dividends declared under the new law and adjustment, if any, must be made in the event the court upholds the contention of the plaintiffs that stock dividends are not taxable. Because of the failure of the court to render a verdict many large companies which have been expecting to declare stock dividends have postponed action. Among these companies are the Youngstown Sheet & Tube Co., the Brier Hill Steel Co., the Trumbull Steel Co., and other important steel concerns.

Marietta Tin Plate Plant Going Into Operation

Otis & Co., Cleveland, bankers, have taken over the management of the Hudson Sheet & Tin Plate Co., with a tin plate plant at Marietta, O., constructed by Danish interests during the war, and the property now is being put on an operating basis. The plant consists of six modern tin plate mills with an annual capacity of about 450,000 base boxes. One mill now is running. Three are expected to be in commission by June 1, and the remaining three by July 15. In the new organization, George W. York of Otis & Co., is president, J. H. MacLeod Jr., of Otis & Co., is secretary and treasurer; R. R. Beachler, general manager, and W. G. Brangham, formerly superintendent of the Wheeling plant of Merchant & Evans Co., will be superintendent of the mill. Laurence Hamill has been appointed general sales manager of the company and W. B. Hickox, assistant general sales manager with headquarters in the Hickox building, Cleveland.

Obituaries

AMBROSE M. ROBBINS, aged 82, a pioneer in the iron and steel industry in the Cleveland and valley districts, died May 26, at his residence in the New Amsterdam hotel, Cleveland. About 15 years ago he retired from the M. A. Hanna Co., but had kept closely in touch with the industry ever since. He was born in Niles, O., and was a son of Josiah Robbins, one time iron manufacturer and member of the state legislature. He was graduated from Allegheny college, Meadville, Pa. Later he studied law in Warren, O., and was admitted to the bar. He served one year and a half with the Ohio volunteer infantry as adjutant and captain and was invalided home. Subsequently, Mr. Robbins engaged in mercantile pursuits in Cleveland and then entered the iron business at Niles, O., as manager of the Falcon Iron Co. Mr. Robbins soon became affiliated with the M. A. Hanna Co., and at the time of his retirement was general manager of the Claire Furnace Co., Sharpsville, Pa.

John Llewellyn, vice president of the Llewellyn Iron Works, Los Angeles, died recently in New York City.

John Francis Hamill, president of the Alexander Hamill Iron Works Co., died May 21, at his home in Jersey City, N. J.

Starr H. Barnum, founder of the iron foundry conducted for 50 years under the name of S. H. Barnum in New Haven, Conn., which makes gray iron castings, died at his home in that city, May 10, aged 86 years.

David Richards, aged 48, president of the Hill & Griffith Co., Cincinnati, O., manufacturer of foundry equipment and supplies, died at a sanitarium in New York.

Thomas L. Queenan, secretary-treasurer of the O'Malley-Beare Valve Co., 80 East Jackson boulevard, Chicago, died May 20 of heart disease. He was one of the organizers of the company and had been connected with it for nine years.

Maj. George W. Debevoise, retired, for many years in the iron manufacturing business, died May 13, at his home, 13 East 128th street, New York City, aged 79 years. Major Debevoise was the father of Paul Debevoise, of Debevoise-Anderson Co., 56 Liberty street, New York.

Capt. Henry S. Sauerman, of the engineering firm of Sauerman Bros., Chicago, died May 20, at Chicago. In 1918 he was awarded the Octave Chanute medal by the Western Society of Engineers for a paper on fortifications.

Alfred C. Gary, cousin of Judge Elbert H. Gary, chairman of the board of directors of the United States Steel Corp., died at his home in Wheaton, Ill., following a short illness. He was 55 years old. He was senior member of the Chicago branch of the banking house of Shearson, Hammill & Co., New York.

Fred Holz, retired machine toolmaker of Cincinnati, formerly president of the Cincinnati Milling Machine Co., committed suicide, May 12. He was 67 years old, and had been connected with the machine tool business in Cincinnati practically all of his life. Herman Holz, a son, is president of the National Machine Tool Co. of Cincinnati.

Joseph Douglass Gallagher, vice president and general counsel of the American Brake Shoe & Foundry Co., 30 Church street, New York City, died May 20, aged 65. Mr. Gallagher was a life long resident of Glen Ridge, N. J. After being educated at Wesleyan university, Delaware, O., and at Princeton university, Princeton, N. J., he took up the practice of law at Newark, N. J., entering the firm of Whitehead & Gallagher. He later became interested in the Lappin Brake Shoe Co., of Bloomfield, N. J., which was absorbed by the American Brake Shoe & Foundry Co.

Matthew Griswold, chairman of the board of directors of the Griswold Mfg. Co., Erie, Pa., manufacturers of aluminum and iron kitchen utensils, died recently at his home in that city. Mr. Griswold in association with Samuel Selden, founded the Selden & Griswold Mfg. Co. in 1865. At the death of Mr. Selden the company became the Griswold Mfg. Co., Mr. Griswold, therefore, having been connected with the enterprise ever since its foundation. For two terms Mr. Griswold served as the representative of the Erie district in the national congress. Five sons survive, four of whom are engaged in the manufacturing business in Erie. Matthew Griswold Jr. is works manager of the Erie branch of the General Electric Co. Marvin E. Griswold is president, Ely Griswold, vice president and R. W. Griswold, secretary and treasurer of the Griswold Mfg. Co.

Tool Market Fast Regaining Poise

Some Satisfactory Business Placed—Many Inquiries Pending—Standard Oil Co., and E. W. Bliss Co. Large Buyers in East—Railroads Expected to Buy Tools Shortly—Steel Plants to Buy Equipment

PROGRESS toward a normal market in machine tool and equipment lines is becoming better defined from day to day. The trade is showing more and more optimism and expectations are high for a real buying movement early in June. While present bookings are not in keeping with the number and size of inquiries received, dealers report satisfactory order books. In Pittsburgh, sales have been few, but several prospective purchasers are about to close. Chief among these are the Weirton Steel Co., the Carbon Steel Co., and the Riter-Conley Mfg. Co. Sales in the Chicago territory continue to show a pleasing aggregate but are made up of small lots, three tools to one order being considered unusual. The largest sales are reported in the East, where the Standard Oil Co. has commenced to buy in earnest for Bayway, N. J. Its purchases are expected to reach or exceed $300,000. A similar amount is being expended for equipment by the E. W. Bliss Co., Brooklyn, N. Y., and among prospective purchasers in that district are the American Shell Co., Paterson, N. J., which is to produce motors; the Locomobile Co., Bridgeport, Conn., which has issued a large list; the Bethlehem Steel Co., Sparrows Point, Md., and the Midvale Steel & Ordnance Co., Cambria, Pa. The Jamestown Die & Tool Corp., Jamestown, N. Y., desires a fair sized quantity of equipment. H. W. Cotton, Inc., New York, is to build a $1,000,000 plant.

Requirements of the railroads are lined up but are still held in abeyance. Because the railroad administration has placed some of its rail requirements, the machinery trade hopes that it soon will make its tool purchases. The Pennsylvania is desirous of obtaining tools and crane equipment for Stark, O. The Baltimore & Ohio has issued an inquiry for 26 tools, which are understood to be needed immediately. The Chicago & Alton has not closed as yet on its list issued recently and a few more railroads in the West and other districts have their purchases held up, due to lack of appropriations.

Cleveland dealers have before them a large number of inquiries from varied lines of manufacture and their chief difficulty is getting deliveries on some of the larger types of tools. Most of the recent demand has come from the automotive field, although diversified lines are represented by the inquirers. The Parrish & Alford Fence & Machine Co., Knightstown, Ind., wants several tools and the Browning Co., the Brown Hoisting Machinery Co. and the Cleveland Hardware Co., all of Cleveland, are in the market for equipment.

Talk is heard in the East about disposing of the government's $75,000,000 worth of tools abroad, contingent upon satisfactory credits being arranged. Reference is made to some sales made to Belgium at 10 per cent under prevailing market prices with three years to pay. Paul Floyd & Co., New York, has issued an export inquiry for lathes, screw cutters, drilling machines, etc.

Crane inquiries come from the Standard Oil Co., Bayway, N. J., the Baltimore & Ohio railroad, the Midvale Steel & Ordnance Co., Cambria, Pa., the Montgomery Iron & Steel Co., Philadelphia. Recent sales were made to the E. W. Bliss Co., Brooklyn, N. Y., and Armour & Co., Chicago.

Standard Oil Commences Real Buying for Bayway

CONSIDERABLE buying of machine tools now is being done by the Standard Oil Co. of New Jersey for its plant at Bayway, N. J. The total will reach $300,000. An occasional lot of equipment has been purchased from time to time for this plant, but not until recently has there been any buying of volume. No action, however, is being taken on the Roumanian list, and it is likely that this business will continue in abeyance for some time.

Aside from the orders for Bayway, and the recent large buying by the E. W. Bliss Co., Brooklyn, involving more than $300,000 worth of equipment, no business of particular consequence has been transacted in the east. Inquiry continues to improve and there are several attractive propositions in sight. The Baltimore & Ohio railroad, which is inquiring on a list of 26 machine tools, will probably close as soon as congress, now in session, has made sufficient appropriations. The American Shell Co., Paterson, N. J., has decided upon taking up the production of motors, and will probably need quite a little new equipment, and the Locomobile Co., Bridgeport, Conn., is receiving tentative figures on an extensive list of tools for the manufacture of automobiles. The Bethlehem Steel Co. is expected in some quarters to enter the market within the next few weeks for equipment for Sparrows Point, and the Midvale Steel & Ordnance Co., is expected to buy tools for its Cambria plant. Perhaps one of the newest propositions to come up in the east is the construction of large plant in Brooklyn by H. W. Cotton Inc., 233 Broadway, New York City, machinery manufacturer. A 6-story building, 80 x 500 feet, will be erected at an estimated cost of about $1,000,000.

Of much interest to the trade is the proposition now being considered by the government for disposing of its equipment to France and Belgium. The plan of action

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"Ludlum" Steels are annealed in six large oil burning furnaces. The steels before being put in these furnaces are placed in large tubes, as shown in illustration. When the tubes will hold no more, the remainder of the space is packed with a special material used by us. The tubes are then placed it the annealing furnace. After annealing, the bars look exactly as though they had been aluminum plated, and are entirely free from scale; and after being straightened, the round bars appear to have been cold rolled, so smooth is the finish.

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calls for intergovernmental financing, which will establish all necessary credits. The war department, from present indications, has found itself the owner of about $75,000,000 worth of machine tools, which is equivalent to a year's output in the United States. It is known that the government already has taken action somewhat along this line in disposing of its machinery now abroad, as cablegrams received from French machinery representatives state that the government is offering its equipment to Belgium at 10 per cent under prevailing market prices, payments to extend three years. A new export inquiry is that of Paul Floyd & Co., 109 Broad street, New York City. Lathes, screw cutters, vertical drilling machines and welding apparatus are desired.

Included in the few new inquiries to come before the eastern trade is a 10-ton electric crane for the Bayway plant of the Standard Oil Co. of New Jersey. It is understood that contracts for seven additional electric cranes for this plant will be awarded in the near future. The Baltimore & Ohio railroad is inquiring for a 200-ton electric crane. The Midvale Steel & Ordnance Co. is expected to be in the market before the end of the week for cranes for its Cambria plant. It is understood that two cranes only will be purchased at this time. Another list expected to come out shortly is that of the Montgomery Iron & Steel Co., Philadelphia. This company recently awarded a contract for the construction of an addition to its structural shop.

Foremost among recent awards is that of the E. W. Bliss Co., Brooklyn, which placed three 50-ton and three 30-ton overhead cranes with the Shaw Electric Crane Co. Another contract of note was that involving three 10-ton cranes for the plant of Armour & Co., Chicago Heights, Ill. This business was awarded through Westinghouse, Church, Kerr & Co., 37 Wall street, New York, to the Champion Engineering Co. This latter company also received a 5-ton electric crane, with 50-foot span, from the Atlantic Basin Iron Works, Brooklyn.

Business Shows Fair Total in Chicago

ALTHOUGH trading in machine tools continues fairly heavy in the aggregate, it remains devoid of features and the total is made up entirely of small purchases. In fact, a sale of three tools in one lot is considered unusual. Dealers are unable to state a specific source of business since no one line of manufacture predominates and the equipment is going to as varied a line of buyers as the industrial world furnishes. Tractor manufacturers, who have been unusually active until recently, are taking less equipment, apparently having nearly filled their requirements. Railroads are much in need of equipment and have been inquiring more or less, but the only purchases are occasional single tools where buying cannot longer be delayed. Railroad purchasing agents have their requirements well lined up but are unable to place their orders until funds are made available. The Chicago & Alton railroad recently put out a list calling for a few tools. Other railroad lists issued some time ago are still pending. The Buda Co., Harvey, Ill., has not yet closed on its inquiry.

Second hand tools have been moving fairly slowly, but some tendency is noted at present to reduce prices on this sort of equipment and this is having the effect of moving it more readily. As a general statement, machine tool manufacturers are not reducing prices, although a few instances have been noted since the first of the year where reductions of 10 per cent have been made from prices prevailing last year.

The Iron Mountain Co., manufacturer of railway supplies, will build a plant at Pullman, Ill., for which several electric cranes will be required. The Wayman Bruton Co., Chicago, will build a 6-story plant. The Anchor Leather Co., Chicago, will build a power house and manufacturing plant. The Hill Pump Valve Co., Chicago, is having plans made for a new plant. The Bailor Plow Co., Atchison, Kans., will build a machine shop and assembly building. The Port of Seattle commission, Seattle, will ask bids shortly for electric traveling cranes at the Smith Cove terminal. The city of Wells, Minn., will build a power plant and electric distributing system and Hastings, Minn., will take bids soon for a power plant. The Keystone Iron Works, Los Angeles, will build a plant including a foundry, furnaces and electric cranes.

Equipment Contracts to be Closed Soon

TWO or three large equipment contracts, which will be closed in the next week or 10 days are receiving the attention of the machine and tool trade in Pittsburgh at present. These projects are the naval ordnance plant at Charleston, W. Va., the new steel plant of the Weirton Steel Co., Weirton, W. Va., and the new car shop of the Pennsylvania railroad, lines west, at Stark, O. Bids have been opened by the navy department for the machinery for the naval gun plant and now are being checked and compared. It is understood that the Morgan Engineering Co., Alliance, O., and the Cleveland Crane & Engineering Co., Wickliffe, O., are the low bidders on the cranes for that plant. The Weirton Steel Co.'s requirements, which include cranes and other steel plant machinery, are expected to be announced shortly and now that the railroad administration has placed its rail requirements, hopes run strong that the machinery for the Stark car shops will be let immediately. Bids were asked on 10 cranes for this plant.

The Carbon Steel Co., Pittsburgh, shortly will be in the market for a continuous furnace charger. The Riter-Conley Mfg. Co., Pittsburgh, is in the market for a 30-foot vertical boring mill and a vertical turret lathe with 42-inch swing, direct current motor driven. Dealers' sales are not particularly numerous, although more inquiries are coming out. The improvement in sentiment in steel trade circles is extending to the machine and tool business and larger bookings are expected before long.

Cleveland Dealers Report Improvement

IN keeping with the sentiment of general industry, the machine tool trade in the Cleveland district shows a consistent improvement. Those dealers who aggressively seek business, realizing that the days of buyers begging them to accept orders passed with the war, report satisfactory sales sheets. The past week has been particularly good in sales. A splendid rate of inquiry is being maintained and while of course bookings could be larger, still some pleasing business has been contracted for. A tendency is noted among manufacturers to replace some of the inferior equipment bought hastily during the war with machines of the better grades.

Trading is not well defined as coming from any one industry outside of the automobile and parts manufacturing, orders being placed by diversified lines. So far as can be learned, no railroad business has been placed, although it is known that purchasing agents of many lines have their requirements made up and have made some tentative inquiry, endeavoring to locate machines needed against the time when they will be able to go ahead with their purchases.

One of the chief complaints made by dealers is the difficulty they are experiencing in obtaining delivery of new tools of the higher priced types. While lathes can be had, deliveries on grinders for instance are post dated to September or October of the present year. In many cases this is damaging the sale of new tools, since the present

demand for the most part, is coupled with a desire for prompt delivery.

Dealers are active upon inquiries from the Cleveland Hardware Co., the Browning Co., and the Brown Hoisting Machinery Co., Cleveland, and the Galvanized Products Co., of that city, is understood to be in the market for some equipment. One of the largest inquiries of the week however, comes from the Parrish-Alford Fence & Machine Co., Knightstown, Ind., for used tools in first-class condition. It wishes to obtain one No. 1 or No. 2 universal cutter and tool grinder, one 18-inch and one 24 to 28-inch quick change gear lathe, one emery wheel stand, one keyseating machine, one 20 or 21-inch shaper, one electric portable drill for drills up to 5/8-inch, one No. 2 or No. 3 universal milling machine with dividing head and swivel base and one 36 x 36-inch x 10-foot planer. Another fair sized inquiry is being issued by the Jamestown Die & Tool Corp., Jamestown, N. Y. It is building a plant to manufacture dies, punches, tools and special equipment and wishes to obtain lathes, shapers, milling machines, drills, planers, grinders and general tool room supplies, new and used. The Art Metal Construction Co., of that city, is understood to be in the market for a general line of machine tools for a new plant it is erecting. A prospective purchaser of machine tools is the Transport Truck Co., Mt. Pleasant, Mich. It is to erect a truck-manufacturing plant 160 x 300 feet and a power plant, 32 x 40 feet. The Advance Pump & Compressor Co., Battle Creek, Mich., is understood to be placing orders for $75,000 worth of machinery. Modern machine tool equipment is being installed by the Peter Bros. Mfg. Co., Algonquin, Ill., in its new addition to manufacturing tapping and other machinery. All of its equipment requirements have not as yet been placed by the Fellows Gear Shaper Co., Springfield, Vt. R. G. Lundgreen, 3347 North Halsted street, Chicago, is receiving quotations on a 16-inch x 8-foot double back geared lathe, and on a 14-inch and a 16-inch x 6-foot engine lathe. Keros Mfg. Co., Chicago, desires to obtain a 14-inch x 6-foot engine lathe. The Western Automatic Machine Screw Co., Elyria, O., is endeavoring to locate some 3/8-inch or 1/2-inch automatic nut tappers.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Plants

AUGUSTA, ME.—The Dakota Light, Heat & Power Co. has been incorporated with $1,600,000 capital, by C. L. Andrews and R. W. Farris.

ATTLEBORO, MASS.—The Frank Mossberg Co. will build a 1-story, 60 x 140-foot addition to its machine shop.

BOSTON.—The Standard Rim Co. has been incorporated with $5000 capital, by E. T. Stearns, Paul C. Adams, South Braintree, Mass., and others.

BOSTON.—The American Steam Gauge & Valve Co. has purchased the property of the R. B. Phillips Co., Worcester, Mass., manufacturer of screw machine products.

BOSTON.—The John L. Judd Co. has been incorporated to make automobiles, trucks, etc., with $75,000 capital, by John L. Judd, B. A. Clark and Robert W. Forrest.

BOSTON.—The Boyd Mfg. Co. has been incorporated to make tools, appliances, etc., with $10,000 capital, by James Boyd, Horace N. Case, Hyde Park, Mass., and John R. Parry.

FALL RIVER, MASS.—The plant of the Lincoln Mfg. Co. recently was slightly damaged by fire.

GARDNER, MASS.—The Blanchards, Inc., has been incorporated to make silverware, cutlery, etc., with $40,000 capital, by Porter C. Blanchard, H. S. Blanchard and S. S. Radley.

GREENFIELD, MASS.—The Smith Foundry & Mfg. Co. has been incorporated with $50,000 capital, by Harry S. Way, Robert H. Smith and M. J. Levy.

HOLYOKE, MASS.—The Clark Mfg. Co. has been incorporated to make wire cloth, machinery, tools, etc., with $20,000 capital, by Alvan S. Clark, Peter S. Sinclair and S. L. Clark.

LAWRENCE, MASS.—The Davis Foundry Co. has let the contract for the erection of a foundry, 100 x 200 feet.

LEE, MASS.—The Clark-Aiken Co. has been incorporated to build machinery, etc., with $125,000 capital, by Henry A. Clark, W. S. Aiken and James O'Brien.

LYNN, MASS.—The Shaw Mfg. Co. has been incorporated to make automobile accessories, etc., with $100,000 capital, by Ira D. Shaw, J. Alfred Bowie and Joseph E. Dozier.

SPRINGFIELD, MASS.—The National Equipment Co., 660 North Main street, has awarded a contract for the erection of a plant addition, two stories, to be built at an estimated cost of $100,000.

NEW LONDON, CONN.—The Sidney Mfg. Co., springs, etc., is reported contemplating the erection of a 4-story plant.

SPRINGFIELD, VT.—Work on the erection of two plant additions has been started by the Fellows Gear Shaper Co. The additions will be 2 stories, 144 x 147 feet and 3 stories, 40 x 100 feet.

WEST SPRINGFIELD, MASS.—Boutwell, Dewsnap & Field, Inc., has been incorporated to make automobiles with $25,000 capital, by Harris M. Boutwell, Harlan E. Field and Stanley Dewsnap.

WHITMAN, MASS.—The Whitman Electric Mfg. Co. has been incorporated with $12,000 capital, by Harry A. Goss, George G. Roberts, Wollaston, Mass., and Frank Sanford.

WORCESTER, MASS.—The Truscon Steel Co. has the contract for a 1-story, 50 x 160-foot storehouse for the Norton Co.

WORCESTER, MASS.—The J. R. Torrey Razor Co., 128 Chandler street, has awarded a contract for the erection of a blacksmith shop, one story, 20 x 78 feet.

BRIDGEPORT, CONN.—The Presteel Mfg. Co. has been incorporated to manufacture tools and machinery, with $25,000 capital, by Herman J. Storm, Andrew H. Carlson and Gustave A. Berg.

BRISTOL, CONN.—The Wallace Barnes Co., 118 Wallace street, manufacturer of screw machine products, etc., has taken bids for a 1-story plant addition, 60 x 100 feet.

BRISTOL, CONN.—Bids have been received by the Wallace Barnes Co., manufacturer of screw machine products, for the erection of a 1-story, 60 x 100-foot plant addition.

GREENWICH, CONN.—The Abendroth Foundry has been acquired by Phillip H. Mallory and associates.

North Atlantic States

BROOKLYN, N. Y.—The Robert Gair Co., 50 Washington street, contemplates the erection of a boiler house extension.

BROOKLYN, N. Y.—The Reliable Pianopin Mfg. Co., hardware and appurtenances, has been incorporated with $30,000 capital, by L. and M. Naham, M. E. Thompson, 285 State street.

BROOKLYN, N. Y.—The Adler Mfg. Co., 271 Meserole street, manufacturer of metal specialties, will make extensions and alterations to its plant.

BROOKLYN, N. Y.—The Derosa Corp., auto rims, wheels and accessories, recently was incorporated with $250,000 capital, by M. J. Hertel, J. C. Danzilo and A. Derosa, 255 Fourth avenue.

BUFFALO.—The Bronze-Alumina Corp. plans to erect a foundry, 37 x 102 feet. John H. Whiting is manager.

JAMAICA, N. Y.—The Shore Instrument & Mfg. Co., 527 West Twenty-second street, New York, has let a contract for the erection of a 3-story plant.

50 x 100 feet, to be built at an estimated cost of $30,000.

LAKE PLACID, N. Y.—George & Bliss, Lake street, have awarded a contract for a motor boat plant, 95 x 100 feet, to cost $25,000.

LONG ISLAND CITY, N. Y.—S. Noller, 140 Jackson avenue, is having plans drawn for a garage and machine shop, 25 x 100 feet.

LONG ISLAND CITY, N. Y.—Steinway & Sons, 107 East Fourteenth street, New York, has let a contract for alterations and additions to its plant.

NEW YORK.—The Schebler Carburetor Co. has been incorporated with $10,000 capital, by J. C. Wright, P. and D. Babbott, 68 William street.

NEW YORK.—Zaron & Rose, tools and machinery, recently was incorporated with $6000 capital, by J. Brody, S. Rose and C. Zaron, 174 Centre street.

NEW YORK.—Engineers Sanderson & Porter, 52 William street, are drawing plans for the erection of a plant for the Andes Copper Co., Parquito, Chile.

NEW YORK.—The Erny Candy Machinery Co. has been incorporated with $10,000 capital, by E. and C. E. and H. Erny, 75 Fulton street.

NEW YORK.—The Electric Lock Corp. has been incorporated with $200,000 capital, by C. A. Jayne, A. F. Reed and P. M. Freeman, 81 Fulton street.

NEW YORK.—The Hudson Motor Co. of New York has had plans drawn for the erection of a factory, store and office building, estimated to cost $550,000.

NEW YORK.—The Dry Dock Sheet Metal Works, Inc., has been incorporated with $5000 capital, by A. and M. and F. Schwoerer, 402 West 147th street.

NEW YORK.—The Chester Machine Co. has been incorporated with $6000 capital, by A. G. Manfredona, M. L. Feth and P. Knight, 14 West 107th street.

NEW YORK.—Price & Elkin, Inc., machinery, etc., recently was incorporated with $20,000 capital, by J. F. Curran, E. F. Aller and G. Meyer, 982 East 179th street.

NEW YORK.—The Automatic Fork Corp., hardware, recently was incorporated with $10,000 capital, by M. Bono, G. Cuccia and F. Catanzaro, 121 East Fifth street.

NEW YORK.—F. J. Hill's Sons, Inc., millwrights and machinists, recently was incorporated with $30,000 capital, by J. J. Gibbons, C. and C. H. Hill, 6 Howard street.

ALLENTOWN, PA.—The International Motor Co. is having plans drawn for a factory and assembly plant, one story, 300 x 600 feet, to cost $150,000.

BAKERTON, W. VA.—The Bakerton Water Co. has let a contract for the erection of a waterworks plant.

BERWICK, PA.—The American Car & Foundry Co., 165 Broadway, New York, has awarded a contract for the erection of an office building.

BUTLER, PA.—The Keystone Pipe & Supply Co. will build a plant addition.

CHARLESTON, W. VA.—The George L. Carter Coal Co. will build a steel tipple and make other improvements to its plant.

ECONOMY, PA.—The National Metal Moulding Co., Fulton building, Pittsburgh, has let a contract for the erection of a warehouse addition, one story, 130 x 250 feet.

FRANKLIN, PA.—Charles H. Sheasley and H. F. Grant are interested in the proposed erection of an oil refinery here.

ERIE, PA.—The Erie City Iron Works, East avenue, has let a contract for a plant addition, one story, 40 x 122 feet.

ERIE, PA.—The Lake Erie Welding & Spring Co. contemplates the erection of an electric welding shop, one story.

ELLWOOD CITY, PA.—The American Steel Co., J. P. Kelley in charge, Park building, Pittsburgh, has let a contract for the erection of a steel plant addition.

FRANKLIN, PA.—The city council has bought a site on Elk street on which it plans to erect a sewage disposal plant.

GROVE CITY, PA.—The Machine Shop Equipment Co. recently was incorporated with $50,000 capital, by John Carruthers, John G. Carruthers, John Nordstrom and others.

LANGLOTH, PA.—The American Metal Co., Ltd., B. N. Zimmerman, manager, Oliver building, Pittsburgh, is taking bids for the erection of a mill building addition, one story, 50 x 100 feet.

PHILADELPHIA.—Walter Kidde & Co., Inc., New York, ser drawing plans for a 1-story boiler house, 54 x 90 feet, for the Surpass Leather Co.

PHILADELPHIA.—The Berroth, Pettit Corp. has been chartered to manufacture metal products with $5000 capital, by H. W. Berroth, 220 West Logan street and others.

PHILADELPHIA.—Engineer T. W. Price, 233 Broadway, New York, is making plans for improvements to a foundry. The owner's name has been withheld.

PHILADELPHIA.—Powers, Weightmann & Rosengarten, Ninth and Parrish streets, contemplates the erection of a boiler house addition, one story, 16 x 51 feet.

PHILADELPHIA.—The Philadelphia Roll & Machine Co., a subsidiary of the Taylor-Wharton Iron & Steel Co. will build an addition, 1-story, 46 x 60 feet.

PITTSBURGH.—The International Valve & Piping Co. recently was chartered with $100,000 capital, by B. F. Harris, 6621 Wilkins avenue, H. D. Wilson, 1121 Howard road, and others.

Central States Activity

MENASHA, WIS.—The Menasha Boiler Works recently was incorporated with $50,000 capital.

RACINE, WIS.—The Standard Foundry Co. has moved into its new building and the company is reported to be planning the erection of an extension.

RACINE, WIS.—A contract has been awarded by the American Stein & Foundry Co. for an addition.

APPLETON, WIS.—The machine and automobile repair shops of C. Milhaupt & Sons will be enlarged by the erection of a 1-story, 50 x 90-foot addition.

BEAVER DAM, WIS.—A public garage and repair shop, 60 x 150 feet, will be erected by Edmund F. Dode, at an estimated cost of $25,000.

KENOSHA, WIS.—The Macomber & Whyte Rope Co., wire rope and cable manufacturer, plans the erection of a 2-story office building, 60 x 100 feet, and has let the general contract.

MILWAUKEE.—The Grate-Cut Mfg. Co. has been incorporated with $10,000 capital, to manufacture machinery for meat markets, etc., by Edward M., Jacob L. and Robert E. Bauer.

MILWAUKEE.—Contracts have been awarded by the Maas Carbonator Co., 250 West Water street, for the erection of a machine shop and factory at an estimated cost of $25,000.

MILWAUKEE.—A 1-story, 100 x 140-foot garage will be erected by Albert J. Stoltz, 235 National avenue, at an estimated cost of $20,000.

MILWAUKEE.—The Chas. Abresch Co., Fourth and Poplar streets, has leased the manufacturing building at 381-383 Fourth street, and is remodeling it for an addition to his machine shop.

BATTLE CREEK, MICH.—The Advance Pump & Compressor Co., C. A. Fleno, purchasing agent, will build a machine shop, foundry and power house.

BENTON HARBOR, MICH.—The Frederickson Axle Co. has purchased a building here and is installing machinery and equipment.

DETROIT.—The American Blower Co., 1400 Russell street, is taking bids for the erection of a plant.

DETROIT.—The Michigan Stamping Co. plans to build a 1-story craneway extension, 40 x 250 feet.

DETROIT.—The Johnston Machine Co., 515 East Forest avenue, will build an addition, 61 x 70 feet.

DETROIT.—The Charles Bohn Foundry Co., Hart avenue, will build a power plant, 80 x 100 feet.

DETROIT.—The Stampweld Co. has been incorporated to manufacture metal products with $10,000 capital, by J. F. Whitehead, T. W. Burke and C. H. Taylor.

DETROIT.—The Superior Tool & Machine Co., capitalized at $15,000, has been incorporated to do general machining and manufacture tools, by Claude H. Harris, Andrew Birthelmer and William Arnold.

GRAND RAPIDS, MICH.—The Grand Rapids Brass Co. has a permit to erect a $40,000 plant addition.

GRAND RAPIDS, MICH.—The Metal Office Furniture Co. has let a contract for a plant addition, three stories, 50 x 127 feet, to cost $30,000.

PETOSKEY, MICH.—The Petoskey Portland Co. is having plans prepared by J. C. Buckbee & Co., 38 South Dearborn street, Chicago, for a new plant.

ALGONQUIN, ILL.—The Peter Bros. Mfg. Co., manufacturers of abrasive metal cutting machines, will build an addition, 45 x 185 feet.

BROOKLYN, ILL.—The Terminal Railroad association, W. Bawden, superintendent and manager, Union station, St. Louis, will build a boiler shop, 50 x 150 feet.

CHICAGO.—The International Harvester Co. is building a 4-story coal crushing plant, 34 x 54 feet.

CHICAGO.—The Ajax Forge Co., 2503 Blue Island avenue, has let a contract for the erection of a plant addition.

CHICAGO.—The Interstate Iron Co., 104 South Michigan avenue, has let a contract for alterations to its foundry, estimated to cost $10,000.

CHICAGO.—The Iron Mountain Co., a new concern in the railroad equipment supply business, recently purchased a site adjoining the plant of the American Brake Shoe & Foundry Co., on which it will build a modern plant.

ANDERSON, IND.—The Roberts Axle Truck & Tractor Co., capitalized at $50,000, has been chartered by L. E. Jones, Orville W. Roberts and Joseph W. Jackson.

INDIANAPOLIS.—The Computing Visible Measure Pump Co., capitalized at $20,000, has been chartered to manufacture measuring pumps by Frank L. Godby, James H. McConnell and Russell T. MacFall.

KOKOMO, IND.—The M. J. Hoffman Construction Co., Evansville, Ind., has the contract to build a $450,000 building for the Haynes Automobile Co. The building will contain an assembling plant and forge shops, and will be four stories, 120 x 800 feet.

PERU, IND.—The Miami Screw Machine Products Co. recently increased its capital.

PLYMOUTH, IND.—The Keystone Foundry Co., capitalized at $10,000, has been chartered by John E. Fogarty, D. E. Fogarty and George Pehl.

GARY, IND.—The Gary Screw & Bolt Works will reconstruct the part of its plant recently damaged by fire.

BELLEFONTAINE, O.—The Kauffman Metal Parts Co. has purchased a site for a new plant including a brass foundry.

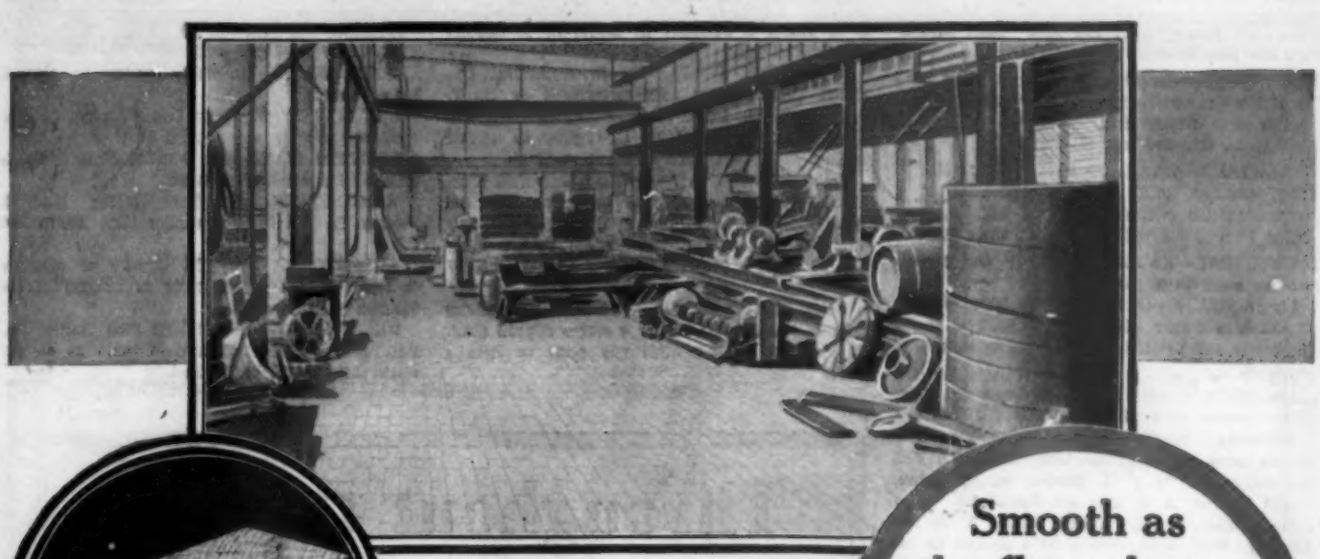
CANTON, O.—A permit has been issued for the erection of a plant addition for the Folwets Welding Co., Second street. The building will be two stories, 35 x 100 feet.

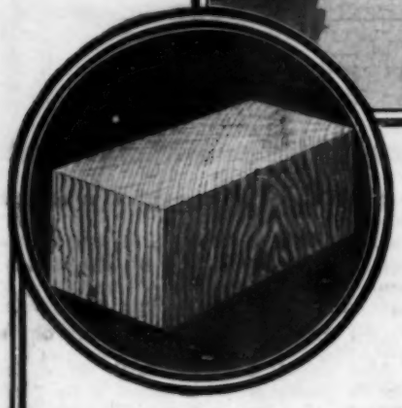
CLEVELAND.—The Union Rolling Mill Co., Aetna road, plans a scale house, one story, 30 x 80 feet.

CLEVELAND.—The Wheeler Radiator & Mfg. Co. recently purchased a site here on which to build a plant. W. H. Ritter is president of the company.

CLEVELAND.—The Guide Motor Lamp & Mfg. Co., 11400 Madison avenue, recently let a contract for the erection of a plant, 60 x 180 feet, to be built at an estimated cost of $15,000.

CLEVELAND.—The Peerless Motor Car Co., Quincy avenue, recently let a contract for three plant addi-





Don't Delay!

Smooth as the floor shown above—and for as many years as your factory walls stand

—when your old plank floor, cement floor, or brick floor, starts to go, you will save money by reflooring *at once* with Kreodone Wood Blocks.

—Each week's delay means just that much wasted time and added expense for repairs to the old floor—repairs which at best only cause *more* delays and trouble.

Kreodone EVERLASTING **Wood Block Floors**

last forever. They cost less than other floors to begin with; and there is *no* expense for repairs.

Let us show you how you can solve the problem of floor expense by Kreodone

Republic Creosoting Company, Indianapolis, Indiana

Plants: Indianapolis Minneapolis Mobile Seattle Norfolk

315 Peoples Gas Bldg., Chicago
204 Erie County Bank Bldg., Buffalo
152 Bay Street, Toronto, Canada
Berkley Ward, Norfolk

Branch Offices:

222 Society for Savings Bldg., Cleveland
31 Transportation Bldg., Philadelphia
828 Plymouth Bldg., Minneapolis
445 Central Bldg., Seattle
Masonic Temple, Mobile

tions, four stories, 40 x 150 feet. Total expenditure has been estimated at $150,000.

CLEVELAND.—The Ohio Electric Controller Co., 5900 Maurice avenue, has let a contract for the erection of a 2-story plant, 80 x 100 feet, to be built at an estimated cost of $50,000.

CLEVELAND.—The Sabin Machine Co., H. B. Sabin, president, 6536 Carnegie avenue, has let a contract for the erection of a plant addition, three stories, 50 x 80 feet, estimated to cost about $25,000.

CINCINNATI.—The Globe Wernicke Co. contemand one story, 74 x 150 feet.

COSHOCTON, O.—Ground has been broken for the erection of a 2-story addition to the plant of H. D. Beach. It will be used as an assembling room when completed.

COLUMBUS, O.—The Columbus Conveyor Co. is reported planning to build a plant, 100 x 180 feet.

FOSTORIA, O.—The Bradley-Dionne Mfg. Co., printing press machinery, has been incorporated with $10,000 capital, by F. J. Bradley, M. C. Dionne, Charles W. Yost, A. G. Gray and Herbert Ash.

MANSFIELD, O.—The Triumph Electric & Ice Machine Co., South street, recently let a contract for the erection of a plant, one story, 60 x 86 feet, to be built at an estimated cost of $10,000.

MANSFIELD, O.—The Hughes Keenan Co. will begin the construction of a plant for the manufacture of steel stair and ornamental iron works. The first unit will be erected at an estimated cost of $45,000.

MARION, O.—The American Malleable Castings Co. contemplates the erection of a plant addition, 60 x 70 feet. The Osborn Engineering Co., 2848 Prospect avenue, Cleveland, is drawing plans.

TOLEDO, O.—The Gartland Foundry Co. is taking bids for a core room addition, 80 x 84 feet.

plates erecting a plant, three stories, 75 x 350 feet.

MANSFIELD, O.—The Mansfield Sheet & Tin Plate Co. has awarded contracts for the erection of a plant addition.

TOLEDO, O.—The Toledo Machine & Tool Co. has asked city council for permission to extend an electric conduit from an addition outside the city limits to its main plant.

YOUNGSTOWN, O.—The Mahoning Boiler & Tank Co. is reported planning to build a $10,000 plant addition.

ASHLAND, KY.—This city will build a waterworks basin here.

HAZARD, KY.—J. B. Hogue and others will build a waterworks plant here.

ASHLAND, KY.—Albeard & Burdick, Dearborn street, Chicago, have plans for a filtration plant here.

LOUISVILLE, KY.—The Louisville Water Co. is arranging to make improvements to its plant.

LOUISVILLE, KY.—The Stoll Oil Co. plans the erection of a refinery.

LOUISVILLE, KY.—The Kentucky Wagon Mfg. Co. is having plans prepared for the erection of a plant addition.

LUDLOW, KY.—The repair shop of the Pullman Co. recently was damaged by fire. The loss has been estimated at $225,000.

NEWPORT, KY.—James Herman has the plans for a garbage incinerating plant estimated to cost $50,000.

AFFINITY, W. VA.—The Pemberton Coal Co. will build a 1-story machine shop and power plant.

BECKLEY, W. VA.—The Ralph Register Co. will build a plant soon.

CHARLESTON, W. VA.—The New River Coal Co. will make improvements to its plant.

CLARKSBURG, W. VA.—The Clarksburg Gas & Electric Co. will double the capacity of its plant.

CHARLESTOWN, W. VA.—The Kanawha Collieries Co. is arranging to build an electric power plant, 32 x 50 feet.

HUNTINGTON, W. VA.—The Pennegrade Oil & Gas Co. has let the contract to the Hope Engineering Supply Co. for a gasoline plant and pipe line.

HUNTINGTON, W. VA.—The Ohio Valley Mine Car Mfg. Co. has been incorporated with $400,000 capital, by M. J. Ferguson, J. W. Heron and M. E. Brown.

HUNTINGTON, W. VA.—The Black Eagle Lead & Zinc Co., capital $300,000, has been incorporated by J. A. Young, J. Faulkner, W. Brown, H. T. Lambert and R. H. Pepper.

HUNTINGTON, W. VA.—The H. T. Lambert Co., capital $100,000, has been incorporated by H. T. Lambert, R. M. Davis, H. G. Clark, G. Baker and C. F. Cunningham, all of Huntington, to operate a plant and deal in used rails and machinery.

MORGANTOWN, W. VA.—The Morgantown-Kingwood Railroad Co. will build an engine shop and repair house. E. H. Wingrove is superintendent.

MILLVALE, W. VA.—The Northern Virginia Power Co. will build a power house, 33 x 50 and 50 x 57 feet.

PARKERSBURG, W. VA.—This city is considering a bond issue of $100,000 for a sewage disposal plant.

SPENCER, W. VA.—This city plans to erect a power house.

SPENCER, W. VA.—W. S. King will build a machine shop and boiler works, 50 x 120 feet.

WELCH, W. VA.—The Welch Armature Co. plans a 3-story plant.

WHEELING, W. VA.—The Center Foundry Co. has acquired a site for a new plant.

WHEELING, W. VA.—The Wheeling Stamping Co. is contemplating a 2-story addition.

WHEELING, W. VA.—The Wheeling Mold & Foundry Co. will build a machine shop, 300 x 350 feet.

WHEELING, W. VA.—The chamber of commerce is behind a movement to build an addition to the filtration plant here.

WHEELING, W. VA.—The West Penn Traction Co., Pittsburgh, is reported planning to locate its car and repair shops at South Warwood, O.

Throughout the West

HASTINGS, MINN.—Bids will be received until Aug. 1 by the state board of control, St. Paul, for the erection of a power plant, 40 x 145 feet, to be built at an estimated cost of $125,000.

WELLS, MINN.—This city is having plans prepared for a power plant and electric disributing system.

CEDAR RAPIDS, IOWA.—The Foster Brass Foundries has been incorporated with $50,000 capital, by W. H. Dutton, H. D. Foster and others.

DAVENPORT, IOWA.—The Crucible Welding Co. is reported planning to erect a 1-story building, 64 x 75 feet.

DES MOINES, IOWA.—The Peoria Tractor Corp. will erect a plant here.

DUBUQUE, IOWA.—Fire recently damaged the plant of the Dubuque Boat & Boiler Works.

CLINTON, IOWA.—The Patent Novelty Mfg. Co. will take bids soon for a plant addition, one story, 48 x 90 feet, to cost $10,000.

FAIRFIELD, IOWA. — Work is expected to be started soon on the erection of an addition to the plant of the Iowa Malleable Iron Co.

DENISON, IOWA.—The Gibson & Rogers Implement Co. will take bids for a garage and farm implement building, to cost $45,000.

MT. AYR, IOWA.—The board of supervisors of Ringgold county will receive bids soon for 65 bridges, to cost $30,000.

WELLS, MINN.—This city is having plans drawn for the rebuilding of its power plant, at an estimated cost of $50,000.

ST. LOUIS.—The Mid-West Mg. Co. has leased a plant here for the manufacture of tools and machinery.

ST. LOUIS.—The St. Louis Boat & Engineering Co. will establish a plant for the building of barges, etc.

GOOSE CREEK, TEX.—The Humble Oil & Refining Co. recently awarded a contract to the Turner Construction Co., 244 Madison avenue, New York, for the erection of a group of buildings, consisting of stills, condensers, filter houses, machine, pipe, electric, carpenter and boiler shops.

TULSA, OKLA.—J. W. Hickok, 516 South Boulder street, is erecting a machine shop, one story, 50 x 100 feet.

ATCHISON, KANS.—The Ballor Plow Co., L. V. Jones, manager, will start work soon on the erection of an assembling building and machine shop. The buildings will be 77 x 180 feet and 100 x 127 feet, and will be erected at an estimated cost of $50,000.

CHADRON, NEBR.—The Chicago & Northwestern railroad will enlarge its yards here.

JEROME, ARIZ.—Bids have been received by T. Maddock, state engineer, Phoenix, for a bridge over the Verde river, costing $40,000.

BEAUMONT, TEX.—The Service Foundry Co., a new industry here, has started operations in its plant on Franklin street.

Business in Canada

GUELPH, ONT.—The Malleable Iron Co. will erect a 3-story plant, 60 x 160 feet.

MONTREAL, QUE.—The A. R. Williams Machinery & Supply Co., Ltd., has moved into its new premises at 320 St. James street.

MONTREAL, QUE.—The Oil Engine Works of Canada, Ltd., has been incorporated to manufacture engines, etc., with $30,000 capital, by Frank Callaghan, Francis X. Biron, Avila Gamache and others.

MONTREAL, QUE.—Plans are under way for the erection of two plants for the Dupre Iron Works Co., to be built at an estimated cost of $75,000. The company is in the market for machinery and equip-

OSHAWA, ONT.—The Ontario Steel Products Co. is reported planning to establish a plant here for the manufacture of motor springs, etc.

OTTAWA, ONT.—Viau & Delphex, 32 Lett street, will build a boiler house.

PARRY SOUND, ONT.—The town council plans the erection of an electric light plant.

ST. UBALDE, QUE.—Henri Dessureault is preparing plans for the erection of a smelting plant here.

TORONTO, ONT.—The H. A. Wood Mfg. Co., Ltd., has been incorporated to manufacture valves, machinery, etc., with $1,000,000 capital, by Melvin G. Hunt, 28 Douglas drive, Charles H. McArthur, 12 Spadina avenue, and others.

TORONTO, ONT.—The Ajax Wire Wheel Corp. of America has a license to manufacture wire wheels, etc., with $40,000 capital, and has appointed W. R. P. Parker, 1126 Traders Bank building, as its representative here.

TORONTO, ONT.—The Globe Automatic Sprinkler Co., Ltd., has been incorporated to manufacture automatic sprinklers, etc., with $45,000 capital, by Walter R. L. Shanks, Francis G. Bush, George R. Brennan and others of Montreal.

Steel for All Purposes

Back of this trademark there is an organization composed of men who have for many years concentrated their energies on Exporting American Iron and Steel Products.

The success achieved by the individual members of this organization can be attributed to their intimate knowledge of foreign markets as well as to the valuable co-operation afforded them by their numerous friends overseas.

Every unit of this combination of forces is eminently qualified, both by training and by experience, for the particular task assigned to him in the wide distribution of "Steel for all Purposes."

Victor E. Karminski & Co., Inc.

291 Broadway, New York, U. S. A.

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H. LAD. LANDAU, Vice-Pres., in Charge of Sales

JOHN H. ALLEN, Vice-Pres., in Charge of Purchases

ALEXANDER KARMINSKI, Treasurer

Iron and Steel Prices

Corrected to Tuesday Noon

Iron Ores

Superior Ores, Per Ton, Lower Lake Ports

Old range Bessemer, 55 iron	$6.45
Mesabi Bessemer, 55 iron	6.20
Old range non-Bess., 51½ iron	5.70
Mesabi non-Bess., 51½ iron	5.55

Warehouse Prices

Steel bars, Boston	3.47c
Steel bars, Chicago	3.37c
Steel bars, Cleveland	3.37c
Steel bars, Detroit	3.33c
Steel bars, Philadelphia	3.10c to 3.25c
Steel bars, New York	3.37c to 3.415c
Steel bars, St. Louis	3.44c
Steel bars, Cincinnati	3.33c
Steel bars, St. Paul	3.595c
Steel bars, Buffalo	3.45c
Iron bars, Boston	3.47c
Iron bars, Buffalo	4.15c
Iron bars, Chicago	3.37c
Iron bars, Detroit	3.93c
Iron bars, St. Louis	3.44c
Iron bars, Cincinnati	3.33c
Iron bars, Philadelphia	4.30c
Iron bars, New York	3.37c to 3.415c
Shapes, Chicago	3.447c
Shapes, Detroit	3.43c
Shapes, Boston	3.65c
Shapes, St. Louis	3.54c
Shapes, St. Paul	3.695c
Shapes, New York	3.47c to 3.515c
Shapes, Cleveland	3.37c
Shapes, Philadelphia	3.37c
Shapes, Buffalo	3.55c
Shapes, Cincinnati	3.43c
Plates, Buffalo	3.75c
Plates, Chicago	3.67c
Plates, Detroit	3.63c
Plates, Boston	3.85c
Plates, St. Louis	3.74c
Plates, St. Paul	3.895c
Plates, New York	3.67c to 3.715c
Plates, Cleveland	3.57c
Plates, Philadelphia	3.57c
Plates, Cincinnati	3.63c
No. 10 blue anl. sheets, N. Y.	4.75c
No. 10 blue anl. sheets, Chicago	4.57c
No. 10 blue anl. sheets, Cleveland	4.47c
No. 10 blue anl. sheets, Boston	4.85c
No. 10 blue anl., Buffalo	4.65c
No. 10 blue anl. sheets, St. L.	4.64c
No. 10 blue anl. sheets, Cincinnati	4.53c
No. 10 blue anl. sheets, St. Paul	4.795c
No. 10 blue anl. sheets, Detroit	4.53c
No. 28 black sheets, Chicago	5.37c
No. 28 black sheets, New York	5.50c
No. 28 black sheets, Cleveland	5.27c
No. 28 black sheets, Boston	5.90c
No. 28 black sheets, Cincinnati	4.99c
No. 28 black sheets, Detroit	5.43c
No. 28 black sheets, St. Louis	5.30c
No. 28 black sheets, St. Paul	5.595c
No. 28 black sheets, Buffalo	5.70c
No. 28 galv. sheets, Chicago	6.72c
No. 28 galv. sheets, Boston	7.10c
No. 28 galv. sheets, Cleveland	6.62c
No. 28 galv. sheets, Cincinnati	6.28c
No. 28 galv. sheets, Detroit	6.65c
No. 28 galv. sheets, St. Louis	6.79c
No. 28 galv. sheets, Buffalo	7.05c
No. 28 galv. sheets, New York	6.50c

Sheet Schedule

Black

Differentials for gage, per 100 pounds.

No. 30	+20c
No. 29	+10c
No. 28 (carloads)	Base
No. 27	—05c
Nos. 25-26	—10c
Nos. 22-24	—15c
Nos. 17-21	—20c
Nos. 15-16	—25c
Nos. 13-14	—30c
Nos. 10-12	—35c

Standard Sizes

Gages Nos. 12 to 30 inclusive, 24, 26, 28 and 30 inches wide by 72, 84, 96 and 120 inches long. Gages Nos. 14 to 28 in addition to the foregoing, 36 wide by 96 inches and 120 inches long.

Extras for width and length to be added.

Galvanized and Long Terne

Differentials for gage, per 100 pounds.

No. 30	+50c
No. 29	+25c
No. 28 (carloads)	Base
No. 27	—15c
Nos. 25-26	—30c
Nos. 22-24	—45c
Nos. 17-21	—60c
Nos. 15-16	—75c
Nos. 12-14	—90c
Nos. 10-11	—1.00

Standard Sizes

Gages Nos. 12 to 30 inclusive, 24, 26, 28, 30 and 36 inches wide by 72, 84, 96 and 120 inches long.

Extras for width and length to be added.

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$1.40
Newark, N. J.	4.80
Boston	5.20
Philadelphia	4.40
Pittsburgh	1.40
St. Louis	4.60
Minneapolis, St. Paul	5.70

Buffalo to:

Albany, N. Y.	$1.75
New England (rail)	3.90
New York and Brooklyn (rail)	3.90

Virginia furnaces to:

Philadelphia	$4.10
New England	4.70
Brooklyn, Jersey City, Newark	4.40

Birmingham, Ala., to:

Boston	$8.00
Cincinnati	3.60
Chicago	5.00
Cleveland	5.00
Louisville, Ky.	3.30
Minneapolis, St. Paul	7.30
New York	7.70
Philadelphia	6.50
Pittsburgh	5.70
Savannah, Ga.	3.40
St. Louis	4.25

Chicago to:

Des Moines	$3.50
Minneapolis, St. Paul	2.50
Milwaukee	.60
Moline, Ill.	1.40
Omaha	4.50
St. Louis	1.90

Ironton and Jackson, O., to:

Chicago	$3.80
Cincinnati	1.80
Cleveland	2.40
Detroit	2.60
Indianapolis	2.30
Minneapolis, St. Paul	5.70

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:

New York	27.0 cents
Philadelphia	24.5 cents
Boston	30.0 cents
Buffalo	21.5 cents
Baltimore	23.0 cents
Cleveland	17.0 cents
Cincinnati	23.0 cents
Chicago	27.0 cents
Detroit	23.0 cents
Minneapolis and St. Paul	49.5 cents
Denver	$1.00
St. Louis	33.5 cents
New Orleans	38.5 cents
Birmingham	57.5 cents
Pacific coast (all rail)	$1.25
Pacific coast (tin plate)	1.25

Blue Annealed

Differential for gage per 100 pounds

Nos. 8 and heavier	— 5c
Nos. 9 and 10 (carloads)	Base
Nos. 11 and 12	+ 5c
Nos. 13 and 14	+10c
Nos. 15 and 16	+20c

Standard Sizes

Widths—24-26-28-30-36 and 48 inches.
Lengths—72-84-96-120 and 144 inches.
Extras for width and length to be added.

Tubular Goods

Steel Pipe

Pittsburgh basing discounts to jobbers in carloads

STANDARD WEIGHT

Butt Weld

	Black	Galvanized
⅛, ¼ and ⅜-inch	80½	24
½-inch	54½	40
¾ to 3-inch	57½	44

Lap Weld

2-inch	50½	38
2½ to 6-inch	53½	41
7 to 12-inch	50½	37
13 to 14-inch	41	..
15-inch	38½	..

PLUGGED AND REAMED

Butt Weld

1 to 3-inch	55½	42
2-inch	48½	36

Lap Weld

2½ to 6-inch	51½	39

EXTRA STRONG PLAIN ENDS

Butt Weld

⅛, ¼ and ⅜-inch	46½	29
½-inch	51½	39
¾ to 1½-inch	55½	43
2 to 3-inch	56½	44

Lap Weld

2-inch	48½	37
2½ to 4-inch	51½	40
4½ to 6-inch	50½	39
7 to 8-inch	46½	33
9 to 12-inch	41½	28

DOUBLE EXTRA STRONG PLAIN

Butt Weld

½-inch	42½	32
¾ to 1½-inch	45½	35
2 to 2½-inch	47½	37

Lap Weld

2-inch	40½	31
2½ to 4-inch	42½	33
4½ to 6-inch	41½	32
7 to 8-inch	36½	28

Wrought Iron Pipe

Pittsburgh basing discounts to jobbers in carloads

THREADS AND COUPLINGS

Butt Weld

	Black	Galvanized
⅛ and ¼-inch	29½	2½
⅜-inch	30½	3½
½-inch	34½	16½
¾ to 1½-inch	39½	23½

Lap Weld

2-inch	32½	18½
2½ to 6-inch	34½	21½
7 to 12-inch	31½	19½

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG PLAIN ENDS

Butt Weld

⅛, ¼, ⅜-inch	28½	11½
½-inch	33½	20½
¾ to 1½-inch	39½	24½

Lap Weld

2-inch	33½	20½
2½ to 4-inch	35½	23½
4½ to 6-inch	34½	22½
7 and 8-inch	26½	14½
9 and 12-inch	21½	9½

DOUBLE EXTRA STRONG PLAIN ENDS

Butt Weld

	Black	Galvanized
½-inch	20½	8½
¾ to 1½-inch	25½	18½

Lap Weld

2-inch	20½	8½
2½ to 4-inch	22½	13½
4½ to 6-inch	21½	12½

Lapweld Boiler Tubes

Discounts off manufacturers' standard list, in carloads; less carloads, 4 points less.

Steel

1¾ and 2-inch	19
2¼-inch	24
2½ to 3½-inch	30½
3½ to 4½-inch	40½

Iron

1¾-inch	+20
2 and 2¼-inch	+10
2½ and 2¾-inch	+ 1
3 and 3¼-inch	— 1½
3½ to 4½-inch	—10

Electric Steels

SILICO-CHROME MANGANESE

SPRING STEEL ROLLED BILLETS

DIE BLOCKS

PISTON RODS

FORGED AND HEAT TREATED

FORGED CAR AXLES

Heat Treated

Superior Properties

Write for data

HAMMERED TOOL STEEL BARS

BEARING STEELS

GENERAL STEEL COMPANY

Public Service Building **MILWAUKEE, WISCONSIN**

DETROIT REPRESENTATIVE: 832 Dime Bank Building

Iron and Steel Scrap Prices

Corrected to Tuesday Noon

Steel Works Scrap

Gross Tons Delivered to Consumer

HEAVY MELTING STEEL

Pittsburgh	$15.50 to 16.00
Chicago	15.50 to 16.00
Eastern Pennsylvania	14.50 to 15.50
Cleveland	15.00 to 15.50
St. Louis	14.00 to 14.50
Buffalo	14.50 to 15.00
New York (dealers' prices)	12.25 to 12.75
New Jersey points	14.00 to 14.50
Cincinnati	14.00 to 14.50
Birmingham	12.50 to 13.50
Valleys	16.50 to 17.50
Boston	11.50 to 11.75

BUNDLED SHEETS

Pittsburgh	$12.00 to 12.50
Eastern Pennsylvania	12.00 to 13.00
Cleveland	11.00 to 11.50
Buffalo	11.50 to 12.00
Cincinnati	9.50 to 10.00

STEEL RAILS, SHORT

Chicago	$17.25 to 17.75
Cleveland	18.00 to 18.50
St. Louis	16.00 to 16.50
Birmingham	12.00 to 14.00

STOVE PLATE

Pittsburgh	$16.00 to 16.50
Chicago	17.50 to 18.00
Eastern Pennsylvania	17.00 to 18.00
Cleveland	18.00 to 19.00
St. Louis	15.75 to 16.25
Buffalo	18.50 to 19.00
New Jersey points	17.25 to 18.25
Cincinnati	13.00 to 13.50
Birmingham	15.00 to 16.00

LOW PHOSPHORUS

Pittsburgh, billet and bloom crops	$22.00 to 23.00
Chicago, billet and bloom crops	19.50 to 20.50
Eastern Pennsylvania No. 1	19.00
Eastern Penna. (guaranteed, plate scrap)	21.50 to 22.00
Buffalo	21.00 to 22.00

SHOVELING STEEL

Chicago	$15.25 to 15.75
St. Louis	13.50 to 14.00

KNUCKLES, COUPLERS AND SPRINGS

Pittsburgh	$16.00 to 16.50
Chicago	17.00 to 17.50
St. Louis	15.50 to 16.00

BALED SHEETS

Pittsburgh	$13.50 to 14.00
Chicago	12.00 to 12.50

FROGS, SWITCHES, GUARDS

Chicago	$15.50 to 16.00
St. Louis	14.50 to 15.00
Eastern Pennsylvania	14.50 to 15.50

BOILER PLATE, CUT

Chicago, No. 1	$12.50 to 13.00
St. Louis, No. 1	11.50 to 12.00

ANGLE BARS—STEEL

Chicago	$16.00 to 16.50
St. Louis	14.50 to 15.00

Iron Mill Scrap

Gross Tons Delivered to Consumer

RAILROAD WROUGHT

Pittsburgh, No. 1	$18.00 to 19.00
Pittsburgh, No. 2	17.00 to 18.00
Chicago, No. 1	17.25 to 17.75
Chicago, No. 2	16.00 to 16.50
Eastern Pennsylvania, No. 1	22.00 to 23.00
Cleveland, No. 1	18.00 to 18.50
St. Louis No. 1	16.25 to 16.75
St. Louis, No. 2	14.00 to 14.50
Buffalo, No. 1	19.00 to 19.50
Cincinnati, No. 1	18.00 to 18.50
Birmingham, No. 1	12.00 to 14.00
New York No. 1 (dealers' price)	16.50 to 17.00
Valleys No. 1	18.00 to 19.00
Boston	17.25 to 17.50

WROUGHT PIPE

Eastern Pennsylvania	$17.25 to 17.75
Eastern Pennsylvania, ungraded	11.00 to 12.00
Buffalo	13.00 to 14.00
New York	14.00 to 14.25
Boston	14.00

YARD WROUGHT

Eastern Pennsylvania, No. 1	$18.00 to 19.00

CITY WROUGHT

New York, long (dealers' price)	$16.00 to 16.50
New York, special	14.50 to 14.75

BUSHELING

Chicago, No. 1	$15.25 to 15.75
Chicago, No. 2	10.00 to 11.00
Cleveland, No. 1	14.00 to 15.00
Cleveland, No. 2	13.75 to 14.50
St. Louis	13.50 to 14.00
Buffalo, No. 1	13.00 to 14.00
Cincinnati, No. 1	14.00 to 14.50
Eastern Pennsylvania, No. 1	14.00 to 15.00

MACHINE SHOP TURNINGS

Pittsburgh	$9.50 to 10.00
Chicago	5.00 to 6.00
Eastern Pennsylvania	10.50 to 11.00
Cleveland	8.00 to 8.50
Buffalo	7.00 to 7.50
New York (dealers' price)	8.50 to 9.00
St. Louis	5.50 to 6.00
Cincinnati	7.00 to 7.50
Birmingham	6.50 to 7.50
Valleys	11.00 to 11.50
Boston	6.50 to 6.75
Boston (blast furnace)	6.00 to 6.50

CAST IRON BORINGS

Pittsburgh	$10.00 to 11.00
Chicago	9.00 to 9.50
Eastern Pennsylvania	12.50 to 13.50
Cleveland	9.00 to 10.00
St. Louis	7.50 to 8.00
Buffalo	11.00 to 12.00
New York (dealers' price)	9.50
Cincinnati	8.00 to 8.50
Birmingham	6.50 to 7.50
Valleys	11.50 to 12.00
Boston	8.25 to 8.75
Boston (blast furnace)	6.00 to 6.50

IRON AXLES

Pittsburgh	$26.00 to 27.00
Chicago	28.50 to 29.00
Eastern Pennsylvania	28.00 to 30.00
Cleveland	27.00 to 28.00
St. Louis	28.00 to 28.50
Buffalo	23.00 to 24.00
Cincinnati	22.50 to 23.00

IRON RAILS

Chicago	$20.00 to 21.00
Cleveland	22.00 to 23.00
St. Louis	20.50 to 21.00
Buffalo	21.00 to 22.00
Cincinnati	21.00 to 22.00

PIPES AND FLUES

Chicago	$13.50 to 14.00
Cleveland	13.50 to 14.00
St. Louis	12.50 to 13.00

GRATE BARS

Chicago	$16.25 to 16.75
Cleveland	17.00 to 17.50
Buffalo	21.00 to 22.00
New Jersey points	16.25 to 17.00
Eastern Pennsylvania	16.50 to 17.50

FORGE FLASHINGS

Cleveland, large	$11.00 to 11.25
Cleveland, small	13.75 to 14.25
Chicago, small	12.00 to 12.50
Boston	10.00 to 10.50

FORGE SCRAP

Chicago	$16.00 to 16.50
Eastern Pennsylvania, No. 1	12.00 to 13.00

ARCH BARS AND TRANSOMS

Chicago	$24.00 to 25.00
St. Louis	21.00 to 21.50

ANGLE BARS—IRON

Chicago	$19.50 to 20.00
St. Louis	16.00 to 16.50

Iron and Steel Works Scrap

Gross Tons Delivered to Consumer

AXLE TURNINGS

Pittsburgh	$13.00 to 13.50
Eastern Pennsylvania	11.50 to 12.50
Boston	8.00 to 8.50
Cleveland	12.00 to 12.50
Buffalo	13.00 to 14.00
Chicago	11.75 to 12.00

STEEL CAR AXLES

Pittsburgh	$25.00 to 26.00
Eastern Pennsylvania	28.00 to 30.00
Cleveland	26.50 to 27.50
St. Louis	23.00 to 23.50
Buffalo	23.00 to 24.00
Chicago	25.00 to 25.50
New York (dealers' price)	21.00 to 22.00
Birmingham	18.00 to 20.00
Boston	19.00 to 20.00

SHAFTING

Eastern Pennsylvania	$23.00 to 25.00
St. Louis	20.00 to 20.50
New York (dealers' price)	19.00 to 20.00
Chicago	21.00 to 21.50

Iron Foundry Scrap

Gross Tons Delivered to Consumer

CAR WHEELS

Pittsburgh iron	$21.00 to 22.00
Pittsburgh, steel	17.00 to 17.50
Chicago, iron	20.00 to 20.50
Eastern Pennsylvania, iron	23.00 to 24.00
Cleveland, iron	21.00 to 22.00
St. Louis, iron	18.00 to 18.50
Buffalo, iron	21.00 to 22.00
Birmingham, iron	20.00 to 21.00
Birmingham, tram car	20.00 to 21.00
Boston	17.75 to 18.00

NO. 1 CAST SCRAP

Pittsburgh, cupola	$21.00 to 22.00
Chicago, cupola	22.00 to 22.50
Eastern Pennsylvania, cupola	21.00 to 22.00
Cleveland, cupola	21.00 to 22.00
New York, cupola (dealers' price)	19.00 to 20.00
Cincinnati, No. 1, cupola	20.00 to 22.00
Birmingham, cupola	20.00 to 22.00
St. Louis, railroad	20.50 to 21.00
St. Louis, agricultural	19.50 to 20.00
Buffalo	21.00 to 22.00
Boston	18.50 to 19.00

HEAVY CAST

New York (dealers' price)	18.00 to 19.00
Buffalo	21.00 to 22.00
Pittsburgh	18.50 to 19.00
Eastern Pennsylvania	18.00 to 19.00
Cleveland	17.00 to 18.00

MALLEABLE

Pittsburgh, railroad	$14.50 to 15.00
Pittsburgh, agricultural	13.50 to 14.00
Chicago, railroad	16.75 to 17.25
Chicago, agricultural	16.25 to 16.75
Eastern Pennsylvania, No. 1 cupola	15.00
Eastern Pennsylvania, ordinary	15.00
Cleveland, railroad	16.00 to 16.50
Cleveland, agricultural	14.00 to 14.50
St. Louis, railroad	14.00 to 14.50
St. Louis, agricultural	14.00 to 14.50
Cincinnati, railroad	15.00 to 15.50
Cincinnati, agricultural	14.00 to 14.50
Boston	12.00 to 12.50

Miscellaneous Scrap

Gross Tons Delivered to Consumer

RE-ROLLING RAILS

5 feet and over

Pittsburgh	$18.50 to 19.50
Chicago	17.75 to 18.00
Eastern Pennsylvania	17.00 to 18.00
Cleveland	16.50 to 17.00
St. Louis	16.00 to 16.50
Birmingham	14.00 to 15.00
Boston	13.00 to 13.50

LOCOMOTIVE TIRES

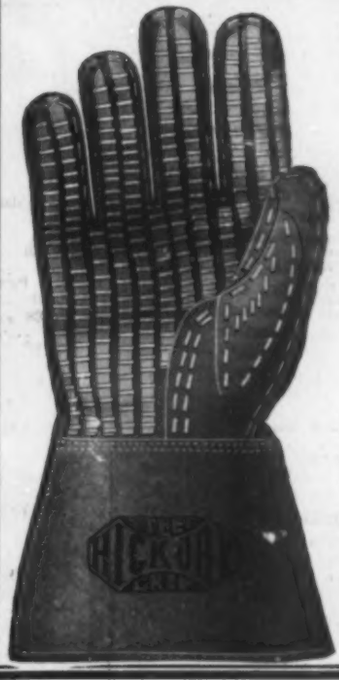
Chicago	$17.50 to 18.50
St. Louis	15.50 to 16.00

BOILER PUNCHINGS

Chicago	$19.50 to 20.50
Eastern Pennsylvania	18.00 to 19.00

Sandblasting?

Steel-grip Six-forty-four provides positive protection and wears longer



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$15.00 per Dozen pairs or All Lefts or All Rights

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OWNERS OF HICKORY STEEL-GRIP GLOVE CO.

Box R-6 CHICAGO, ILL.

Say you saw it in THE IRON TRADE REVIEW

New Trade Publications

CRANES.—An illustrated folder is being circulated by the Chesapeake Iron Works, Baltimore, illustrating cranes and structural equipment built by the company. All of the illustrations are of actual installations.

SOCKETS.—The Cutler-Hammer Mfg. Co., Milwaukee, has issued a folder in which push-button porcelain sockets with white enamel fixtures are described and illustrated. The folder lists the pendent and fixture types of push-button sockets, manufactured by the company.

ROOFING.—A 4-page folder has been issued by the Truscon Steel Co., Youngstown, O., in which flat cement tile for roofing, manufactured by this company is described and illustrated. This cement tile is used on roof purlins with standard spacing of 5 feet. The folder contains a number of illustrations.

INDUSTRIAL ENGINEER.—Frank D. Chase, Inc., Chicago, has issued a booklet reproducing a series of advertisements recently published, bearing the title, "Ideals and Convictions." The series sets forth the ideals of the industrial engineer as to factory construction as well as convictions regarding the present industrial situation and the necessity for going ahead with construction under present conditions.

SAW BENCHES.—A 4-page folder is being distributed by the Oliver Machinery Co., Grand Rapids, Mich., in which a saw bench is described and illustrated. Incorporated in the specifications of this bench are two saw arbors for rip and cross cut saws, roller bearing table and a self-locking tilting mechanism. Safety appliances, etc., which go with the bench, are featured.

LUMBER.—A treatise on America's second largest industry, that of lumbering, is given in an illustrated booklet recently issued by the General Lumber Co., Milwaukee. The 36-page booklet is illustrated with numerous half-tone cuts showing the various processes of lumber manufacture, activities of the "lumberjacks" and scenes at logging camps. The treatise is concise, and gives the reader a brief outline of the various steps of logging and lumber sawing.

STRUCTURAL TOOLS.—An interesting booklet, catalog No. 8, has been published by the Cleveland Steel Tool Co., Cleveland, describing chisels; coupling nuts; die sockets; dies; drift pins; markers; punch stems; punch holders; punches; rivet sets; shear blades and tin and sheet iron sets. Line drawings of these tools are given as well as other valuable information, including a table showing the weights of tool steel.

STEEL FOUNDRY.—The Canton Steel Foundry Co., Canton, O., recently issued a 28-page booklet, containing illustrations of its plant and a number of its products. Among the illustrations are a birdseye view of the plant; the chemical laboratory; the 40-ton open-hearth furnaces; a section of the dry floor; drying ovens; core room; molding floor and pattern shop. The products which are illustrated consist of a number of large castings, including couplings, annealing boxes, gun-mount frames, press platens, etc.

ELECTRIC HOISTS.—Three types of electric hoists are fully described and illustrated in a 16-page booklet recently published by the Northern Engineering Works, Detroit. The first type described is designed for single hook suspension and can readily replace a hand chain hoist. It also is easily attached to an overhead crane. The second is identical with the first hoist described, except that the top hook with its hook saddle is omitted. It is designed for suspension rigidly by bolts through lugs. The third type is similar to the second type, but has a longer frame and a longer drum which is grooved to take the wire hoisting rope without overlapping. Specifications and other data are given.

WATER HEATERS.—A well illustrated 16-page booklet recently was published by the Griscom-Russell Co., New York, in which feed water heaters are described. These heaters are made with cast-iron shells. The coils are of helical construction and this imparts a whirling motion to the water. The rapid agitation of the water results in high heat transfer. The coils are interchangeable and of the same size. According to the booklet, the coils and joints may be inspected and made tight while under boiler pressure without the necessity of breaking pipe-joints. The various parts of the heaters are illustrated and a number of line drawings given.

ENGINE LATHES.—An illustrated booklet of 32 pages has been issued by the Greaves-Klusman Tool Co., Cincinnati, in which a general description of the salient features of engine lathes manufactured by the company is given. According to the booklet, heavy ribbing extends the full depth of the bed and reinforcements are placed under the vees which extend below the tops of the girths. The headstock is heavy and has internal bracing both length and crosswise. It is bolted to the bed with six bolts. The spindle is turned from solid, high-carbon spindle steel. Other parts of the machine are described and numerous illustrations, including several of machine attachments, supplement the descriptions.

Business Changes Recently Announced

BECAUSE its business has increased so much in the south, the Macomber & Whyte Rope Co., Kenosha, Wis., manufacturer of wire rope and wire, has opened a branch at 805 American Trust Bank building, Birmingham, Ala., in charge of James A. Boope. It also has opened a branch at 30 Church street, New York City. It is in charge of E. E. Robirds. Complete stocks will be carried at both points.

Joseph Myerson has removed from 270-278 Commercial street, Boston, to larger quarters, at 411-413 Atlantic avenue and 74 Purchase street, with a complete line of steam, electrical and power transmission machinery.

* * *

L. V. Estes, Inc., Chicago, industrial engineer and accountant, has removed its offices from the McCormick building to the Century building, 202 South State street.

* * *

Henry M. Sperry, who is publicity representative for the Union Switch & Signal Co., General Railway Signal Co., Federal Signal Co., and the Hall Switch & Signal Co., has removed his headquarters from 120 Broadway to 347 Madison avenue, New York.

* * *

The Empire Machinery & Supply Co., has removed from 651 Ellicott square to 66 Exchange street, Buffalo.

* * *

W. R. Spencer, dealer in used machinery, recently moved his office to 150 Nassau street, New York.

* * *

The Messer Welding Supply Corp., 113 Eleventh street, Brooklyn, N. Y., has purchased the entire business and patent rights of the former Messer Mfg. Co., Philadelphia.

* * *

The Thew Automatic Shovel Co., Lorain, O., manufacturer of power shovels, has opened a branch office at 1164 Monadnock block, Chicago, in charge of A. J. Bright.

* * *

At the annual meeting of the stockholders of the United Coal Corp., First National Bank building, Pittsburgh, held recently, it was decided to change the firm name to the Hillman Coal & Coke Co., effective June 1. The officers of the new company are as follows: Chairman of the board, J. H. Hillman Jr.; president, T. W. Guthrie; vice presidents, A. B. Sheets, Ernest Hillman and Thomas Watson, and treasurer, Robert W. Flenniken.

* * *

The Findeisen & Kropf Mfg. Co., 2559 West Twenty-first street, Chicago, has changed its name to the Brencke & Kropf Mfg. Co.

* * *

The Kramer Rotary Harrow Co., Morton, Ill., has changed its name to the Eagle Mfg. Co., doubling its capitalization to $100,000.

* * *

Torris Wold & Co., Chicago, manufacturers of machinery for can-making, have changed their corporate name to the Cameron Can Machinery Co.

* * *

The Union Drawn Steel Co., Beaver Falls, Pa., has opened a branch sales office in Cleveland at 608-610 Rockefeller building, in charge of Fred C. Young.